

Military & Aerospace Electronics®

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THE MAGAZINE OF TRANSFORMATION IN ELECTRONIC AND OPTICAL TECHNOLOGY

UAV control stations

Cockpits on the ground help the experts maneuver today's most sophisticated unmanned aircraft.

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Information management

Warfighters achieve the information advantage with robust technology tools that provide secure, reliable, and real-time access to mission-critical data. **PAGE 24**

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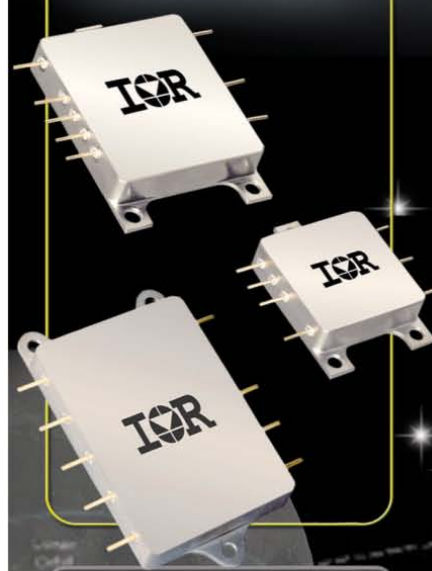
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» ON THE COVER



The July 2010 issue of *Military & Aerospace Electronics* commemorates the 100th anniversary of PennWell, publisher of *Military & Aerospace Electronics*. The cover drawing illustrates aerospace and defense technology over the past 100 years, spanning from the 1909 Wright Flyer to the fighter-size Boeing Phantom Ray unmanned aerial vehicle.

The Dork's guide to electronics thermal management



By **JOHN KELLER**
EDITOR IN CHIEF

Okay, you caught me: I'm a Dork. I've been a Dork for a long time, and qualify for this title on many levels and subjects, yet today's foray into Dorkdom involves electronics thermal management and 19th century American philosopher Charles Sanders Peirce, considered to be one of history's most influential thinkers on pragmatism, epistemology, and logic...

...see, I TOLD you I was a Dork. Anyway, what I always loved about Peirce is his uncanny ability to cut to the chase on all matters, great and small. During his lifetime from 1839 to 1914, he wrote about stuff you can't ignore—a lot like all that heat that comes out of powerful electronics... the heat gives systems designers fits in their attempts to get rid of it.

Here's my favorite quote from Peirce, one that has stuck with me since I first read it in college during the late '70s, and which I thought about while researching this month's Product Intelligence report on electronics cooling and thermal management.

"A court may issue injunctions and judgments against me and I care not a snap of my finger for them. I may think them idle vapor," Peirce wrote. "But when I feel the sheriff's hand on my shoulder, I shall begin to have a sense of actuality. Actuality is something brute."

...and so it is with heat in electronics. You can't theorize it away, you can't wish it away, and sometimes you can't even design it away—not without spending a boatload of money on exotic approaches involving some sort of liquid cooling.

I'm sure there are electronics designers out there who would agree that thermal management in today's electronics is, indeed, something BRUTE. I know more than a few of them out there who are getting a BIG sense of actuality these days when it comes to electronics cooling.

I've been told that removing heat from

electronics is one of the few real threats out there that could lead to the end of Moore's Law—you know, the one that says computing power doubles every 18 months or so? It's hard to get the heat out, and these powerful new computers generate heat, let me tell you.

I'm told the new Intel Core i7 microprocessors that so many are making a fuss over these days—including us—generates in the neighborhood of 45 watts of heat. That's a big problem for the designers trying to build small, lightweight technology for unmanned systems and wearable computers.

I'm also hearing that some influential military systems designers are getting so fed up with the headaches of cooling electronics that they're considering giving COTS up altogether. Yes, you heard that right. Commercial off-the-shelf computing technology often is good stuff, and it's affordable, yet it can be a pain to cool in deployable embedded applications.

Some designers out there evidently are ready to throw up their hands and just start building custom electronics that has the cooling built in from the start, rather than as an afterthought. At the end of the day, it just might not only be more reliable and rugged if they design systems that way, but it might be less expensive, too.

It won't be less expensive to build and buy, but if the military is honest and looks at design, procurement, and lifetime maintenance costs, they might be better off to specify some of the really hot electronics as custom systems, rather than COTS systems.

It's the small stuff that our fighting forces need most these days, and it's the small stuff that is so tough to keep cool. These issues are definitely NOT idle vapor, and today's thermal management engineers still have a lot of work to do.

For more on this subject, see this month's Product Intelligence feature entitled "Military electronics cooling and thermal management issues press for new materials development, potential move away from COTS" on page 34. ●

SENIOR VICE PRESIDENT, GROUP PUBLISHER
CHRISTINE SHAW
TEL (603) 891-9178 • cshaw@pennwell.com

ASSOCIATE PUBLISHER
DOUGLAS M. MAILAT
TEL (603) 891-9137 • dougm@pennwell.com

EDITOR-IN-CHIEF JOHN KELLER
TEL (603) 891-9117 • FAX (603) 891-9146
jkeller@pennwell.com

EXECUTIVE EDITOR JOHN McHALE
TEL (603) 891-9119 • FAX (603) 891-9146
jmchale@pennwell.com

SENIOR EDITOR COURTNEY E. HOWARD
TEL/FAX (509) 587-3344 • courtney@pennwell.com

CONTRIBUTING EDITOR
WESTERN BUREAU J. R. WILSON
TEL (702) 434-3903 • FAX (702) 920-8068
jrwilson@pennwell.com

PRESENTATION EDITOR CINDY CHAMBERLIN
PRODUCTION DIRECTOR SHEILA WARD

SENIOR ILLUSTRATOR CHRIS HIPP
AUDIENCE DEVELOPMENT MANAGER
JAYNE SEARS-RENFER
TEL (603) 891-9416 • jaynesr@pennwell.com

AD SERVICES MANAGER MELANIE LEMONS
TEL (918) 831-9484 • admaterial@pennwell.com



EDITORIAL OFFICES
PENNWELL CORPORATION,
MILITARY & AEROSPACE ELECTRONICS
98 Spit Brook Road LL-1, Nashua, NH 03062-5737
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MARKETING MANAGER JENNIFER McPHAIL
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GROUP EXHIBITS SALES MANAGER JO-ANN PELLEGRINI
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CORPORATE OFFICERS
CHAIRMAN FRANK T. LAUINGER
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VPX embedded technology gets boost as standard high-speed interconnect with ANSI ratification

By **JOHN KELLER**

SCOTTSDALE, Ariz.—The OpenVPX system specification that defines system-level VPX interoperability for multivendor, multimodule, integrated embedded computing system environments, has been ratified by the American National Standards Institute (ANSI) as ANSI/VITA 65.0-2010.

ANSI approval of the OpenVPX standard should bolster confidence in the embedded computer industry that the VPX high-speed serial interconnect will become a widely accepted standard among single-board computer and backplane chassis vendors, and will be widely accepted by prime systems integrators—particularly in the aerospace and defense industry.

VPX is gaining design wins in data-intensive applications, such as signal processing and video processing, radar, communications, transportation, control,

and management, where performance in throughput size is crucial, VITA experts say.

“OpenVPX truly defines a system-wide specification that streamlines the use of VPX,” says Neil Peterson, chairman of the VPX Marketing Alliance. “OpenVPX was defined to give us room to grow the technology and meet future industry needs without impacting current work.”

VPX is a broadly defined technology that uses switch fabric technologies in 3U and 6U Eurocard format modules. The OpenVPX framework delineates clear interoperability points necessary for integrating module to module, module to backplane, and chassis. OpenVPX will evolve and incorporate new fabric, connector, and system technologies as new standards are defined.

For more information, contact VITA’s VPX Marketing Alliance online at www.vita.com.

Rockwell Collins to provide communications research to help warfighters find and attack important targets in real time

By **JOHN KELLER**

ROME, N.Y.—U.S. Air Force researchers are looking to Rockwell Collins Inc. in Cedar Rapids, Iowa, to investigate tactical

targeting network technology (TTNT) and related technologies such as quint network technology (QNT) for communications to and among forward-deployed fighting forces.

The Quint Networking Technology (QNT) program, supervised by the U.S. Defense Advanced Research Projects Agency (DARPA) in Arlington, Va., is developing a modular network data link program to establish multiband communications among manned aircraft, unmanned combat air vehicles (UCAVs), weapons, tactical unmanned aerial vehicles (UAVs), and infantry ground forces.

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IN BRIEF

General Dynamics to provide weapon stations

General Dynamics Land Systems in Sterling, Mich., will supply high-performance Stabilized Commander’s Weapon Stations (SCWS) to the U.S. Army TACOM Lifecycle Management Command of Warren, Mich. The weapon station provides Army and U.S. Marine Corps vehicle commanders with the ability to acquire and engage targets from inside the protection of an armored vehicle. It is designed to mount on a variety of military platforms and works with a high-performance, .50-cal. machine gun. The weapon station has targeting characteristics equal to those of the current M1A1 fire-control system and includes a laser rangefinder and thermal site. Existing General Dynamics Land Systems personnel in Lima, Ohio; Anniston, Ala.; and Sterling Heights will perform the work.

Rapid-fire weapon simulator developed by Cubic

Engineers at Cubic Corp. in Orlando, Fla., developed a weapon simulator that replicates the characteristics of a Gatling-style gun, firing as many as 3,000 rounds a minute. Cubic’s defense division received a total of \$5 million in contracts to supply the M134D Virtual Trainer and other training equipment to multiple locations in the U.S. Cubic’s trainer recreates the ballistics of an actual M134D in a virtual training environment as well as weapon sounds and other characteristics. Two of the simulators are scheduled to be delivered to Department of Energy facilities, where they will be used for facility protection and counterterrorism training along with Cubic’s Warrior Skills Trainer (WST), a virtual vehicle trainer that uses high-fidelity graphics projected on large screens for training scenarios. A third M134D virtual trainer will go to Fort Campbell, Ky., as part of a mobile Cubic training system being used to train U.S. Army Special Forces units. The simulator is modeled after the M134D Minigun, a six-barrel electric-powered machine gun that fires 7.62mm rifle rounds.

NextGen avionics performance standards announced by FAA

Federal Aviation Administration (FAA) officials in Washington announced the performance requirements for aircraft tracking equipment that will be

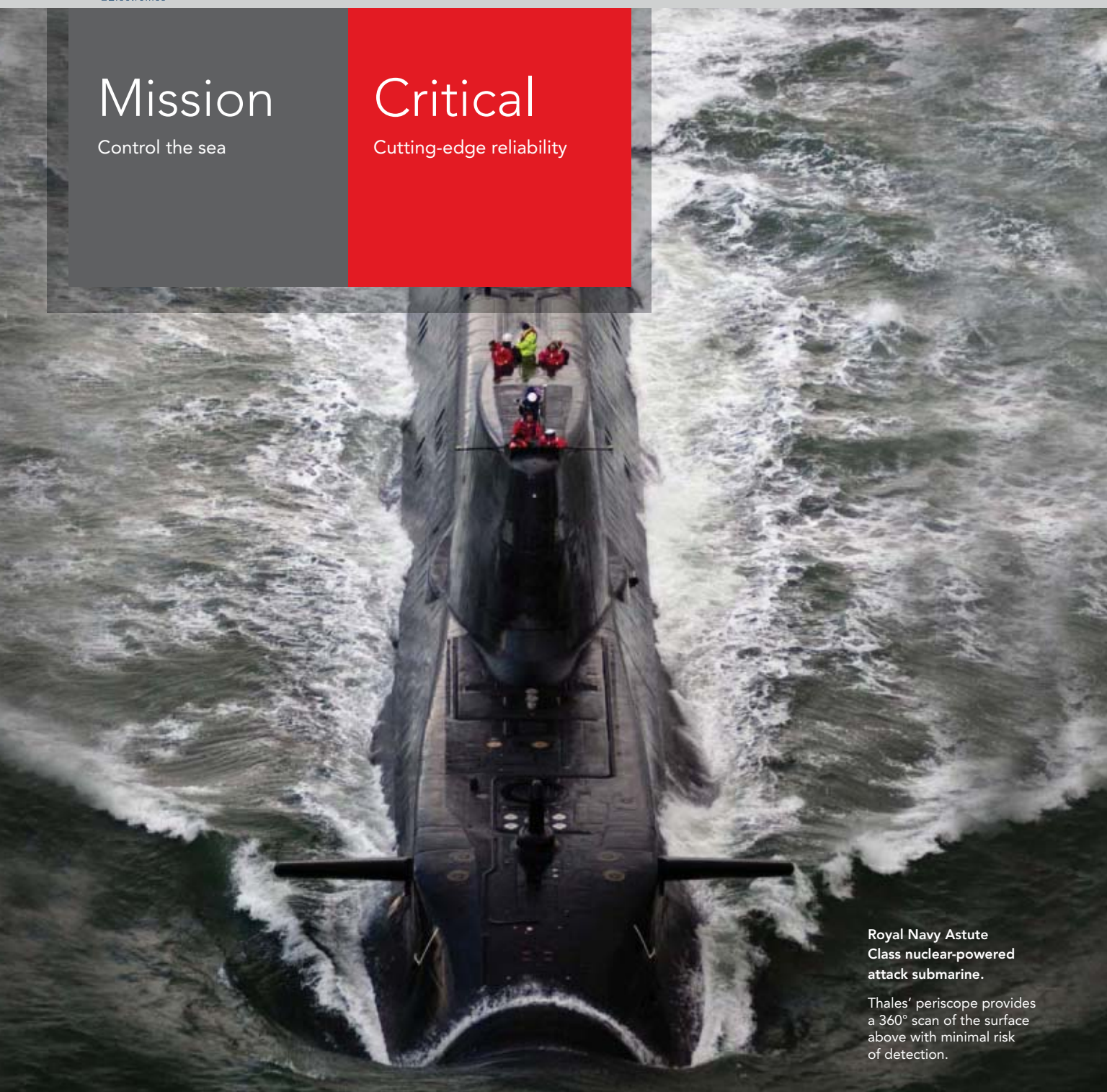
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» NEWS

From uncooled to cooled, FLIR sensor technology builds on soldier solutions

WILSONVILLE, Ore.—FLIR Systems in Wilsonville, Ore., is launching a pair of uncooled infrared sensors that will give soldiers, sailors, airmen, marines, coast guardsmen and law enforcement a low-cost, lightweight, high-performance sensor that can be either handheld or mounted as an infrared weapon sight.

The two Recon M monocular systems, in two performance ranges, each weigh less than 14 ounces, have a 3-hour run time, and zoom to 4X while providing 500 meters of human detect range.

Recon M has a high-resolution, large-format, long-wave VOx microbolometer that delivers range performance and image quality, as well as image and video options that enable the user to configure sensor to mission requirements.

FLIR's STACE image enhancement

technology provides image quality enhancements via spatial edge and dynamic range enhancement; auto gain and level control, which automatically provides optimized imagery; and multi-use capability so that it can be configured for handheld, tripod mount, or helmet mount.

The handheld sensors are part of a long-term FLIR strategy to develop soldier solutions that extend from long-range, cooled thermal and image intensified (I2) binoculars and sniper sights, to tactical sights that can be affixed to a range of weapon types.

"These soldier sensors are small—pocket scopes—that can be used for surveillance and reconnaissance," explains Bill Sundermeier, president of FLIR Government Systems. "They will be inexpensive so that they will be accessible to individual soldiers and unit leaders. They'll keep them

in their pocket or velcro them to their web gear. They'll be able to use them as a handheld night sight, and also clip them onto their weapon to use as a weapon sight."

FLIR Systems has an advantage in the large volumes of detectors and optic devices the company manufactures. The majority of these detectors go into commercial industries like automotive, where standards for shock, vibration, and temperature far outstrip any mil-specs for thermal sensors.

"The two real cost components of an uncooled sensor are the detector and the optics, and we design and manufacture both of those inside our own company, so we have access to much lower-cost components than anybody else," Sundermeier says.

Over the past year, FLIR has offered

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Curtiss-Wright moves to establish itself as systems powerhouse with acquisition of Hybricon

By **JOHN KELLER**

PARSIPPANY, N.J.—Curtiss-Wright Corp. in Parsippany, N.J. announced plans to acquire rugged chassis specialist Hybricon Corp. in Ayer, Mass., for \$19 million in cash in a move to cement its embedded computing segment as a leader in finished rugged embedded computer systems.

“Hybricon...has annual sales of about \$17 million—85 percent of that in the defense market.”

Curtiss-Wright Corp. is the parent company of embedded computing giant Curtiss-Wright Controls Embedded Computing based in Leesburg, Va. Hybricon, meanwhile, supplies high-performance rugged electronic packaging for aerospace, defense,

and commercial applications, as well as rugged backplane designs in OpenVPX, VPX, VXS, VME, VME64X, CompactPCI, rugged MicroTCA, and custom bus structures.

The acquisition of Hybricon by Curtiss-Wright is another move in Curtiss-Wright's strategy to establish itself as a leading embedded computing systems manufacturer. Curtiss-Wright Controls Embedded Computing specializes in single-board computers, while Hybricon designs the rugged enclosures and backplanes necessary to package computer boards.

“The addition of Hybricon's electronic enclosure technologies in our overall design and manufacturing portfolio will expand our system integration capabilities and significantly enhance Curtiss-Wright's

ability to provide mission-critical rugged solutions to customers worldwide,” says Martin R. Benante, chairman and chief executive officer of Curtiss-Wright Corp.

Hybricon, which designs and manufactures custom and standards-based enclosures and electronic backplanes for defense and commercial applications, has annual sales of about \$17 million—85 percent of that in the defense market.

Hybricon will operate in the Curtiss-Wright Electronic Systems division as part of the company's Motion Control segment, alongside Curtiss-Wright Controls Embedded Computing. For more information, visit Curtiss-Wright Corp. online at www.curtisswright.com, Hybricon at www.hybricon.com, or Curtiss-Wright Controls Embedded Computing at www.cwcembedded.com. ●

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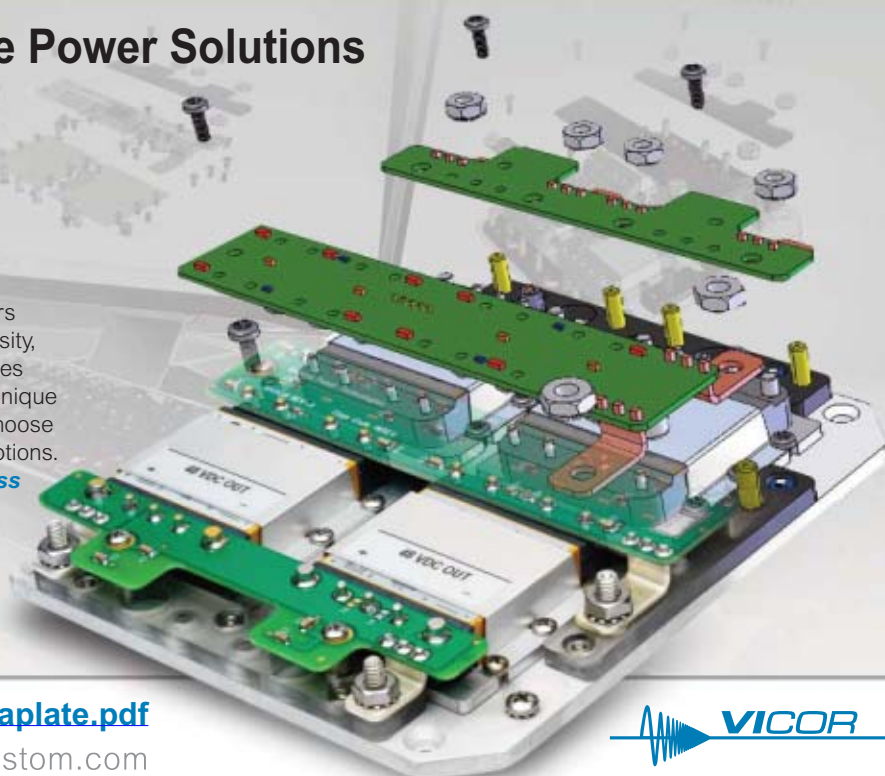
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» NEWS

Navy asks for industry ideas on submarine communications, sonar, and combat systems

By **JOHN KELLER**

WASHINGTON—U.S. Navy researchers are asking industry for new ideas in submarine technology—particularly involving submarine communication, anti-submarine warfare (ASW), submarine combat systems, and towed array sonar applications.

The Naval Sea Systems Command Advanced Development Office for Undersea Warfare in Washington issued a broad agency announcement (BAA 10-IWS5A-01) for basic and applied research in military signal processing and other embedded computing technologies in support of submarine combat systems; signal processing technologies in support of surface anti-submarine warfare systems; and undersea sensor handling and communication technologies.

The Navy is particularly interested in imaging, information management, torpedo detection, anti-torpedo defense, towed-array and hull-array sonar, and acoustic communications for attack submarine and missile submarine applications.

This BAA will be open for one year, closing on 7 June 2011. Navy researchers now are interested only in white papers, rather than in full proposals. The Navy plans to ask industry for proposals based on their white paper submissions.

Of the three primary areas of research interest, Navy experts want ideas from industry framed as white papers in several areas.

In signal processing technologies in support of submarine combat systems, Navy researchers want ideas from industry concerning imaging; passive signal processing; active signal processing; automation, contact management, contact followers, and target motion analysis; information management; and training.

In signal processing technologies in support of surface anti-submarine warfare, the Navy is interested in passive signal processing; active signal processing; torpedo detection, classification and localization; anti-torpedo defense; operator machine interface; training; and contact and data management.

In undersea sensor handling and communication technologies, Navy researchers are primarily interested in three areas.

First, researchers are interested in high-reliability acoustic sensors for towed-array sonar; improved submarine array and tow cable handling and stowage systems; twin line thin line (TLTL) array aperture generation technology; TLTL array line position measurement system; vector sensor and twin line towed array signal processing; low-cost, high-reliability heading, pitch, roll, pressure, temperature sensors; towed array shape estimation systems; low cost, low-noise tunable lasers; and low-cost, low noise, low- and mid-frequency vector sensors.


Second, researchers want industry ideas on acoustic sensing hull array sonar technology such as accelerometers, fiber optics, magnetics, and piezoelectric; connectionless telemetry techniques; and light-weight, high-reliability array cables, connectors, inboard and outboard electronics, hull penetrators array material, and tooling.

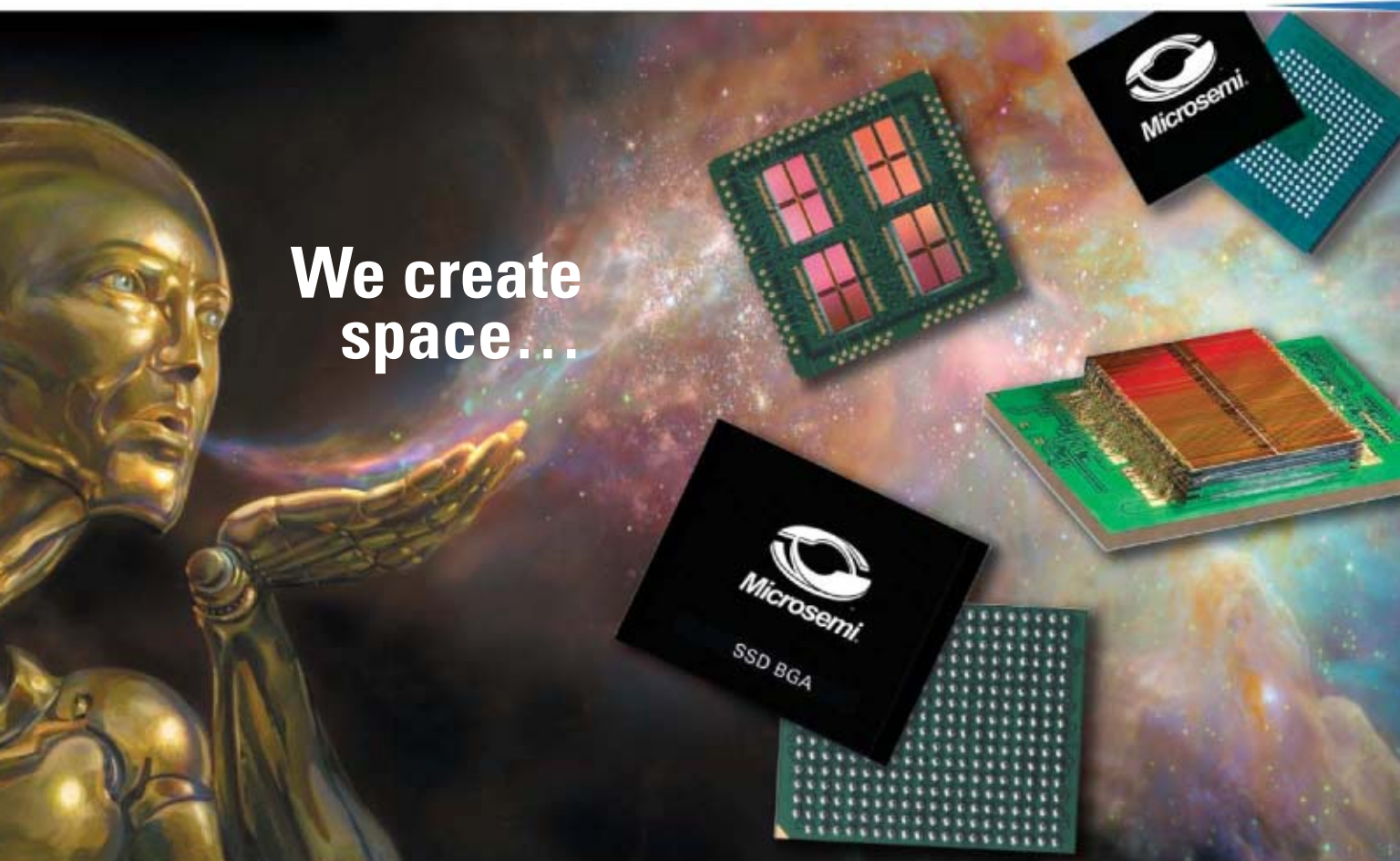
Third, researchers want ideas on acoustic communications—particularly two-way, radio-frequency buoys, encryption, information assurance, integration, and testing on surface ships and submarines, as well as wireless secure connections from off-board sources.

Navy officials expect to provide technical information by conducting industry days or by other means during the one-year open period of this BAA. This is expected in August 2010 for surface signal processing technologies, and November–December 2010 for submarine combat system technologies and undersea sensor technologies.

Companies interested should send white papers to the Navy's Tia Belton by e-mail at tia.belton@navy.mil, or by post to Commander, Naval Sea Systems Command, ATTN: Code 02523, 1333 Isaac Hull Avenue, SE, Washington Navy Yard, Washington, DC 20376.

For questions or concerns, contact Tia Belton by phone at 202-781-2265 or by e-mail at tia.belton@navy.mil, or Cmdr. Alan Boyd by phone at 202-781-2580 or by e-mail at alan.boyd@navy.mil.

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» NEWS

Rockwell from page 6

The intent of QNT technology is to use data links to integrate tactical UAVs, infantrymen, and weapons into the future digital battlefield for effective network-centric warfare operations that use distributed sensor platforms to find, fix, track,


and engage important static and moving targets in real time.

QNT systems users are weapons, air control forces on the ground, and tactical UAVs. These three are the focal points of the QNT effort with the other two elements using hardware and waveforms from established programs.

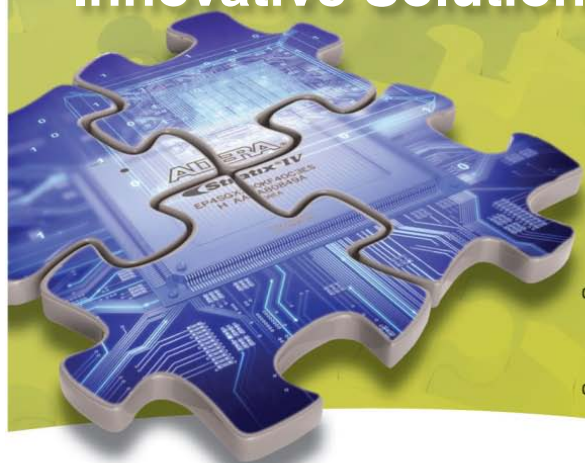
This TTNT research contract will ask military communications experts at Rockwell Collins to develop a Joint Tactical Radio System (JTRS) version of the TTNT waveform that complies with the Software Communications Architecture (SCA), and National Security Agency (NSA) Unified Infosec Criteria (UIC). Rockwell Collins also will develop and demonstrate advanced TTNT and QNT terminals and TTNT directional networking technologies within the next eight months to a year.





Awarding the contract are officials of the Air Force Research Laboratory Information Directorate in Rome, N.Y. The amount of the contract has not yet been determined.

For questions or concerns, contact contracting officer Douglas Rosenthal by phone at 315-330-1957, by fax at 315-330-1777, by e-mail at Douglas.Rosenthal@rl.af.mil, or by post to the Air Force Research Laboratory Rome Research Site, 26 Electronics Parkway, Rome, N.Y. 13441.

More information is online at <https://www.fbo.gov/spg/USAF/AFMC/AFRLRRS/FA8750-10-D-0042/listing.html>. For other information, contact Rockwell Collins online at www.rockwellcollins.com. 

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required under the Next Generation Air Transportation System, or NextGen. The avionics will allow aircraft to be controlled and monitored with greater precision and accuracy by a satellite-based system called Automatic Dependent Surveillance-Broadcast (ADS-B). The final rule, developed with extensive input from the aviation community, requires aircraft flying in certain airspace to broadcast their position via ADS-B by 2020. The rule mandates that the broadcast signal meet specific requirements in terms of accuracy, integrity, power, and latency. Additional ADS-B services should allow pilots to view cockpit displays to see the location of other aircraft in the sky around them. ADS-B displays are envisioned that will show pilots where they are in relation to bad weather and terrain—even at night or in conditions with poor visibility—and provide flight information, including temporary flight restrictions, which allow pilots to plan safe, more efficient routes. The final rule can be found at http://www.federalregister.gov/OFRUpload/OFData/2010-12645_PL.pdf.

Continued on page 14



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FAA awards NextGen engineering contracts worth as much as \$4.4 billion

Federal Aviation Administration (FAA) officials in Washington awarded three separate Next Generation Air Transportation System (NextGen) contracts totaling as much as \$4.4 billion over 10 years. Under the contracts, the companies will perform work that will demonstrate NextGen procedures in real time on a large scale within the current air traffic system. Boeing, General Dynamics, and ITT were awarded the contracts. The three contracts, like one for \$280 million awarded last month to CSSI Inc., are part of System Engineering 2020 (SE2020). Two more contracts are expected under SE2020, which has a ceiling of \$7 billion, making it the largest set of awards in FAA history, FAA officials say. Boeing, General Dynamics, and ITT will conduct large-scale demonstrations, including the use of aircraft as flying laboratories, to see how NextGen concepts, procedures, and technologies can be integrated into the current system. The FAA will work with these companies to develop and demonstrate procedures in four dimensions, adding the element of time to the current three-dimensional profile of an aircraft's latitude, longitude, and altitude.

Boeing completes delivery of software to support 2010 Brigade Combat Team modernization testing

Boeing in St. Louis delivered the final software package to support the 2010 testing cycle for the Brigade Combat Team modernization (BCTM) Increment 1 program. BCTM software improvements for the network include faster system start-up times, reliable continuous operating times, and system stability. The latest BCTM software package enables secure data transfer between classified and unclassified networks; electronic text chat; sensor image transfers to warfighter displays for distribution across the network; image annotation; and monitoring of network status. "This software delivery will fully support our U.S. Army customer throughout the 2010 testing cycle, including the limited user test (LUT) later this year," says Paul Geery, Boeing Network and Tactical Systems vice president and BCTM program manager. "Based on results from last year's LUT and feedback from the Army regarding essential

Continued on page 15

Military must work fast to make its aircraft avionics compatible with NextGen air traffic management system

By **JOHN KELLER**

SAN DIEGO—The U.S. military has started to investigate how its aircraft could participate in the future air traffic management system known as NextGen, yet defense officials have a long way to go before they can even formulate requirements for NextGen-compatible avionics, much less actually deploy this kind of equipment in its aircraft, experts say.

The military has established a NextGen office in the Pentagon, yet is still far behind civil developments at the U.S. Federal Aviation Administration (FAA), says Bill Hershey, principal engineer at the MITRE Corp. in Dayton, Ohio. Hershey made his comments in June at the Avionics USA conference and trade show in San Diego.

The military today has no requirements for NextGen avionics equipment in its aircraft, and so cannot make NextGen-related budget requests until it does, Hershey says. As a result it could be five years or more before the military could start designing and deploying NextGen-compatible avionics.

A second major consideration where NextGen and the military are concerned is need, Hershey points out. NextGen has many capabilities the military does not need now and probably will not in the future, such as required navigation performance (RNP) and Area Navigation (RNAV). Military aircraft typically operate from uncongested military air bases, and so do not have the advanced spacing needs of NextGen-related equipment for heavily used commercial airports.

Military aircraft typically are older than commercial jetliners, and sometimes do not have the technology necessary to participate in NextGen-type air traffic control. "Some people say that nobody operates 707s anymore, but the military does," Hershey told Avionics USA attendees. He

also points out the U.S. Air Force B-52 bomber is one of the oldest military air frames flying.

These older military aircraft do not have the electronic display technology necessary to participate in NextGen. Jet fighter aircraft, in addition, may have the display technology, but must use it for mission-related tasks, rather than for flying in commercial air space.

The military does, however, have needs for sharing commercial air space with

"It could be five years or more before the military could start designing and deploying NextGen-compatible avionics."

commercial and general aviation aircraft, and needs transponder technology to enable them to do so, Hershey says.

The military's primary technology for reporting position information is the Mode-5 transponder, while civil aviation using NextGen technology is moving to automatic dependent surveillance-broadcast (ADS-B) equipment, which is a cooperative surveillance technique for air traffic control and related applications being developed for NextGen.

Hershey says military officials are starting to investigate the possibilities of merging Mode-5 transponder and ADS-B technologies for military use. "We really need to quicken our pace to get equipped," Hershey says.

Hershey points out that much of the NextGen-related military work has been done only with the U.S. Air Force, with hopes for involving the U.S. Navy, Army, and Marine Corps at a later time. Navy officials whose aircraft must operate from aircraft carriers may have different needs from the Air Force, particularly in transponder technology. ●

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cooled and uncooled thermal rifle sights, each of which has benefits and tradeoffs. The detector and the optics are the guts of the matter. Uncooled systems are inherently less sensitive, but potentially much lighter in weight with less power consumption than cooled systems.

To put it another way, cooled systems are for long-range performance, despite the added weight and power of a cryogenic detector cooler, due to their greater sensitivity and ability to use longer-range optics. Uncooled systems are better suited for shorter range applications where light-weight and low-power trump sensitivity considerations.

"Uncooled is better for short-range performance, in terms of those overall tradeoffs," Sundermeier explains. "If what I'm doing is driving a vehicle down the road I don't have to see far. But I do want a wide field of view. So for a sensor that needs a fairly wide field of view and a fairly short range performance, uncooled is great and also inexpensive enough to put on a vehicle.

"Conversely, if I really need to see a long

way then I'm talking narrow fields of view and long focal lengths, and I really want to go cooled because my detector is so much more sensitive," Sundermeier continues. "I can live with these less sensitive optics and really reach out and touch somebody, and also package it in a reasonable size."

Is it impossible to make a man-portable

handheld cooled sensor or sniper sight? "Absolutely not," Sundermeier says. "Products like our Recon III are available, which is cooled, has long battery life, long-range performance, and is light enough to be handheld, relative to other cooled systems."

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battle command capabilities, we expect to show additional capability and demonstrate overall improved system reliability and performance with this software." The LUT is a soldier-driven independent review of maturity, readiness, and functionality, developed and rated by the Army Test and Evaluation Command.

Harris to equip MRAP vehicles with JTRS-approved Falcon III radios

Harris Corp. in Rochester, N.Y., will supply additional Joint Tactical Radio System (JTRS)-approved Falcon III AN/PRC-152 multiband handheld radios and AN/VRC-110 vehicular amplifier adapter systems to the U.S. Department of Defense for use in Mine Resistant Ambush Protected All-Terrain Vehicles (MRAP-ATVs). Harris radios are installed in the majority of M-ATV vehicles deployed to Afghanistan. The AN/VRC-110 is a multiband vehicular radio system, consisting of an amplifier adapter and two Falcon III AN/PRC-152 multiband

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handheld radios, which serve as handheld transceivers. The AN/VRC-110 enables warfighters to maintain communications in dismount operations by allowing the AN/PRC-152 handheld radios to be quickly removed from the vehicle while remaining powered on and connected to the network, Harris officials say. The Falcon III AN/VRC-110 and AN/PRC-152 were developed by Harris following the U.S. military's JTRS Enterprise Business Model. Both radios operate on the JTRS Software Communications Architecture.

Boeing GPS IIF-1 satellite sends first signals from space

Boeing acquired the first on-orbit signals from the Global Positioning System (GPS) IIF-1 satellite, the inaugural spacecraft in a 12-satellite constellation that the company is building for the U.S. Air Force. The signals indicate that the spacecraft bus is functioning normally and ready to begin orbital maneuvers and operational testing. "The new GPS IIF satellites bring key improvements, including a more jam-resistant military signal, a new civil signal to enhance commercial aviation and search-and-rescue operations, and significantly improved signal accuracy as more of these new satellites go into operation," says Craig Cooning, vice president and general manager, Boeing Space and Intelligence Systems.

BAE Systems and Portendo sign IED threat detection agreement

BAE Systems and Portendo AB in Stockholm, Sweden, signed an agreement to cooperate on civil and military detection systems for improvised explosive devices (IEDs). BAE Systems obtains an exclusive license to market, sell, and manufacture Portendo's P.Eye-S in the U.S. and Canada, for the civil market. The P.Eye-S is Portendo's first product for remote detection of explosives, providing safer working conditions for security personnel at airports, military establishments, government buildings, and other potential targets. The agreement also covers the development of a military detection system for roadside bombs based on this technology. It will, under a separate license agreement, be manufactured and sold exclusively by BAE Sys-

Continued on page 17

Defense industry needs to set standards to manage problem of COTS component obsolescence, industry analysts warn

By **JOHN KELLER**

BOSTON—The defense industry needs to develop a comprehensive and standardized solution to manage the problem of rapid obsolescence of COTS components in aerospace and defense applications, warn market researchers at Strategy Analytics in Boston.

Increasing use of commercial off-the-shelf (COTS) has gone hand-in-hand with the growing problem of COTS obsolescence, and industry standards on COTS obsolescence are necessary, even though several methods for COTS obsolescence management have found favor in military procurement in mitigating specific aspects of COTS obsolescence, analysts say.

In addition, the electronics industry must redefine the characteristics of systems that rely on COTS components so that total cost of ownership (TCO) can be evaluated effectively and assessed, Strategy Analytics experts say. Analysts

outlined their position in a report entitled "Cost Implications of COTS Obsolescence Management Trends."

"Even as the defense industry faces multiple challenges in terms of environmental legislation, there is a growing requirement to incorporate countermeasures capabilities in COTS-based systems," says Strategy Analytics analyst Asif Anwar. "This introduces another catalyst for COTS obsolescence that needs to be managed."

Creating standards to manage COTS obsolescence may be expensive, "with growing pressure on defense budgets, Strategy Analytics believes that it is vital that standards for obsolescence management be established, so as to allow the economic implications of those specifications to be properly evaluated on a TCO basis," Anwar says.

For more information, visit Strategy Analytics online at www.strategyanalytics.com.

Air Force to establish research center of excellence in assured cloud computing

By **JOHN KELLER**

ROME, N.Y.—U.S. Air Force researchers want to establish a research center of excellence in assured cloud computing, and they are looking to partner with a college or university to host and collaborate in assured cloud computing research.

The Air Force Research Laboratory Information Directorate in Rome, N.Y., issued a broad agency announcement (BAA-10-10-RIKA), which seeks to establish a University Center of Excellence (UCoE) in Assured Cloud Computing to do research not only in secure computing over blue and/or gray networks, but also whatever is necessary to accomplish Air Force cloud computing.

AFRL researchers want to determine if critical mission information can reach its destination through the computer cloud with predictable latency, rather than packets simply reaching their destinations, without leading to system instability.

The UCoE in Assured Cloud Computing will be a joint effort of the Air Force Office of Scientific Research (AFOSR) in Arlington, Va., the Air Force Research Laboratory Information Directorate in Rome, N.Y., and a college or university.

This collaborative group will do high-priority Air Force research in information assurance for virtual machines and for Internet-based and intranet-based computing

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Cloud computing from page 16

to help understand how network information exchange influences overall network performance and behavior.

Air Force researchers want to develop ways to assess and influence the predictability of heterogeneous Air Force communication networks that assure data transfer, computations, and assured operations in hostile, contested, and high-interference environments.


Colleges and universities interested in participating should have expertise in cloud computer monitoring, virtual machine design, formal protocol design, as well as information and mission assurance. Additional expertise in estimation theory in local and global environments, theory for the design and analysis of communication protocols, and management of computational and communications resources is a plus.

Researchers from the UCoE will work with the Air Force Research Lab on critical military cloud computing challenges,

and will have access to state-of-the-art laboratories to support cutting-edge research to verify mathematically derived results. These efforts are expected to direct refinements of mathematical models.

Total funding for this BAA is approximately \$6 million over six years. For questions or concerns, contact contracting

officer Lynn G. White by e-mail at Lynn.White@rl.af.mil, by fax at 315-330-8120, or by post to AFRL/Information Directorate, ATTN Lynn G. White, 26 Electronic Parkway, Rome, N.Y. 13441-4514.

More information is online at <https://www.fbo.gov/spg/USAF/AFMC/AFRLRRS/BAA-10-10-RIKA/listing.html>. 

» IN BRIEF

tems. This technology can be adapted to vehicle-mounted weapons and sensor systems, such as BAE Systems' Lemur, helping troops to secure an area and clear concealed explosives from a safe distance. Portendo, working with the FOI (the Swedish Defense Research Agency), developed the P.Eye technology which can detect minute quantities of explosives using lasers.

Sikorsky X2 flies faster than average helicopter

Sikorsky Aircraft Corp.'s X2 technology demonstrator achieved a speed of 181 knots in a test flight at the Sikorsky Development Flight Center in West Palm Beach, Fla. The X2 uses an integrated suite of technologies intended to advance the state-of-the-art, counter-rotating coaxial rotor helicopter. It demonstrates that a helicopter can cruise comfortably at 250 knots while retaining such desirable attributes as excellent low-speed handling, efficient hovering, and a seamless transition to high speed. The X2 employs are: fly-by-wire flight controls; counter-rotating rigid rotor blades; hub drag reduction; active vibration control; and an integrated auxiliary propulsion system.

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» SPECIAL REPORT

Cockpits on the ground



The U.S. Navy MQ-8B Fire Scout unmanned helicopter is controlled by two operators in a room onboard ship called the Stir.



Ground control stations for unmanned aerial vehicles (UAVs) are becoming a networking hub where information from the UAVs is passed to the ground control station, then to the whole battlefield network.

Meanwhile, control station designers and the U.S. military are moving toward a common ground control station for all unmanned aircraft.

By **JOHN MCHALE**

Unmaned aircraft are a huge advantage for U.S. forces in Afghanistan and Iraq, providing surveillance, reconnaissance, and precision strike capability to U.S. forces. An ever present eye in the skies, UAV numbers are growing in the battlefield as well as domestically for use by law enforcement, weather monitoring, and by NASA for research.

The aircraft themselves are sexy and exciting, but what many do not realize is that the amazing feats they perform are controlled and monitored from sophisticated ground control stations sometimes thousands of miles away from where the aircraft is flying.

The ground control stations (GCSs) often are located in or near the battlefield but can also be controlled bases in the U.S. A UAV "pilot" could have breakfast with his wife and kids in the morning, head off to work and fly

missions over Afghanistan, then head home for a family dinner at night.

Ground control stations as a network hub

The ground control station has a central role in UAVs, says Christopher Ames, director of strategic development at General Atomics Aeronautical Systems in San Diego. The GCS acts as the hub for the intelligence, surveillance, and reconnaissance (ISR) data generated by the unmanned aircraft's payload, he adds.

Video and other data generated by the sensors such as the General Atomics Lynx synthetic aperture radar (SAR) on the General Atomics Predator UAVs is downloaded via datalinks to the GCS and then that information—in near real-time—is disseminated to troops in the field, other agencies, etc., Ames says. These same groups can also



The ground control stations for unmanned aerial vehicles (UAVs) from Northrop Grumman house multiple displays for the aircraft operator/pilot and payload operator.

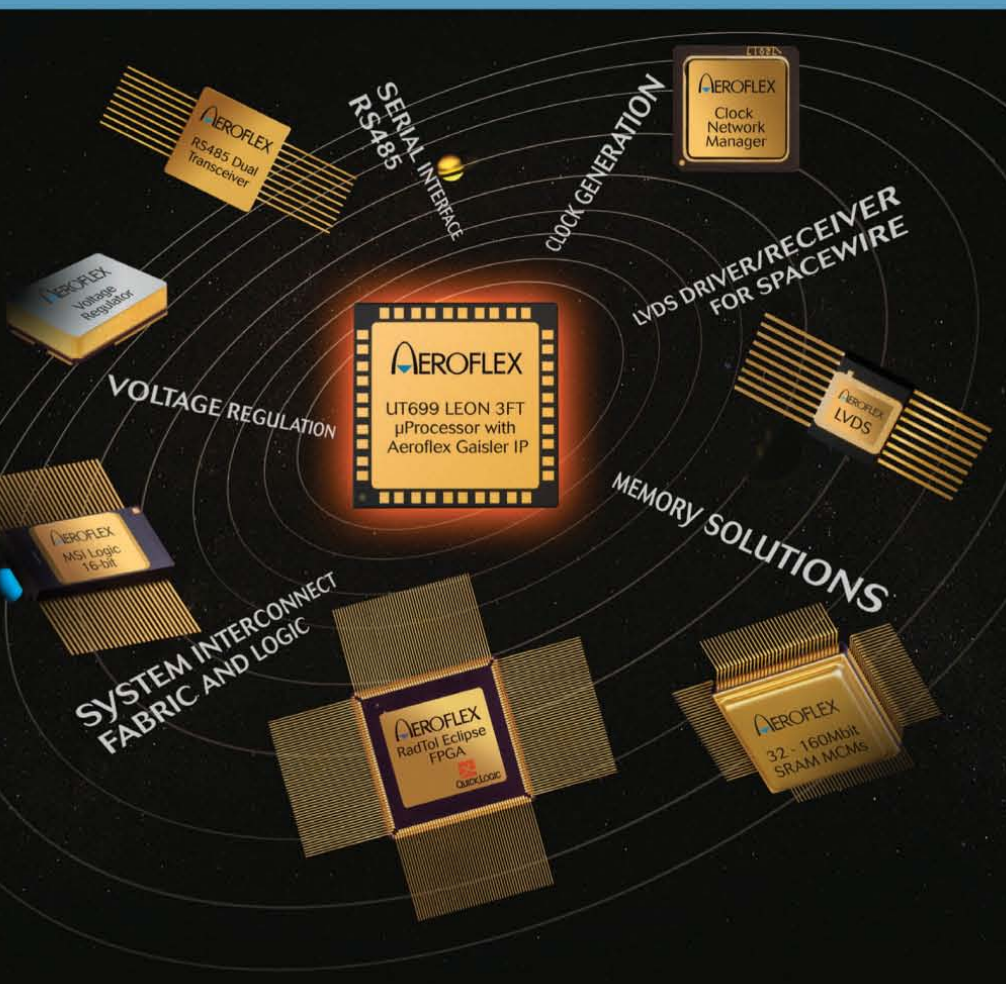
send information to the GCS for upload to the aircraft—for example to have the aircraft fly to specific coordinates or make a strike on a new target, he adds.

A typical UAV ground control station has two consoles—one for the aircraft operator and one for the payload operator, says Ed Walby, director, business development, HALE Systems Enterprise, at Northrop Grumman's Strike and Surveillance Systems division in San Diego.

"The pilot can completely control the aircraft without a joystick," he continues. "Instead he commands changes in aircraft flight by using a mouse and keyboard since the onboard computers are actually manipulating the control surfaces. Mission plans are pre-loaded into the aircraft pre-takeoff, so it is conceivable that the aircraft operator can just sit back and monitor his moving map display without interrupting the mission."

However, it is rare that that happens, as no mission can be completely predicted, he says. The level of autonomy or pilot interaction typically is dictated on a mission to mission basis, Walby says. He notes that most often UAV operators are former or current pilots so that they are trained on air traffic control operations and flight dynamics.

"The pilot generally operates off of two mission displays—a normal pilot cockpit display and a route or map display," Walby says. He also has at least two other monitors up and running displaying multiple chat rooms. The sensor operator has two displays also—one showing sensor status



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» SPECIAL REPORT

Man-portable UAV ground control stations

Controllers for small, man-portable unmanned aerial vehicles (UAVs) are simple, easy-to-use systems that go from a system packed in a rucksack on the warfighter's back to an operable system in five minutes, says Scott Newbern, program manager for Aerovironment in Simi Valley, Calif.

"When the bullets are flying around, operators need the system to be simple to easy and the data easily understood," Newbern says. The operators of these units do not need pilot training, they are part of small units of Special Forces operators or Marines where everyone in the unit is cross-trained, he adds.

The Aerovironment family of small UAVs has a common controller system—used with their Puma AE, Wasp, Swift, and Raven UAVs, Newbern says. It is a modular system that consists of a hand controller for flying the aircraft, a rugged laptop, RF transceiver unit, all plugged into a controller box that is about the "size of two packs of cigarettes," Newbern says. Aerovironment makes all the components except the laptop, which is a Panasonic Toughbook, he adds.

One operator controls the aircraft with a controller unit that consists of a display streaming video from the aircraft's cameras and knobs/dials for controlling the aircraft, Newbern says. Another operator uses the laptop to gather the intelligence data downloaded from the aircraft for analysis and dissemination to other nodes in

the battlefield network, he adds.

The whole ground control system (GCS) can be carried in the warfighter's ruck sack, Newbern says. The GCS without the laptop is just under 8 pounds, he continues.

Conceivably it could be operated by one person, but two operators is the preferred approach, Newbern notes. The GCS can also be embedded in remote locations as a command center that provides the same payload monitoring capabilities of operators in the field, he adds.

The controllers for each Aerovironment UAV are very similar, but do differentiate when it comes to payload control, Newbern says. On the Puma the main payload tool is the mechanical gimbal, while it will be a different electro-optical device on the Raven, he continues. The GCS software recognizes which payload needs to be controlled and adapts to it, Newbern adds.

To improve ease of use, warfighters have asked Aerovironment designers to do something about "specification creep," Newbern says. Over the years the requirements for what operators must have on their displays at all times has created a very cluttered view, he explains.

Therefore Aerovironment engineers are working on decluttering the screen, bringing it back to a more simple display that enables the individual operator to click on different windows to view what they want to look at, Newbern continues.

and the other showing route of flight just like the pilot, also two more monitors for chat rooms."

The General Atomics GCS has a pilot/aircraft operator and a payload operator, who handles all the intelligence coming from the ISR sensors, and electro-optics sensors, and Lynx SAR and who interfaces with others on the battlefield network, Ames says. This gives the pilot and payload operator situational awareness, he adds.

The General Atomics Predator series GCS operators also use high-definition displays, Ames says.

Payload control

In the past the payload operator would be trained to handle the basics of the computer system and forward incoming intelligence

from the UAV to the intelligence analysts, command centers, and troops in the field for analysis, Walby says. Now there is a trend to have the payload operator be trained as an intelligence analyst, so that if he sees something crucial that needs to be exploited immediately and "alert troops in the field as well as analysis centers for time sensitive targeting saving time," he adds.

The payload operator communicates with others in the network through an on-line chat room, similar to the instant messaging services many consumers have on their home computers, Walby says.

For example, the UAV's electro-optics may be tracking a terrorist or other target through Kabul and this person may come in contact with a red vehicle or other object that other agencies may have been

tracking, so the operator passes it along to others in the chat room such as the air operations center (AOC) for possible exploitation in other missions, he continues.

These images and sensor data will be disseminated by the payload operator to the wide area network (WAN) and intelligence analysts in some sector or agency might recognize a person of interest or other target as a data they may have been looking for in a separate independent mission, Ames says.

It is a form of distributed situational awareness—improving the battlefield picture for the UAV operators, troops on the ground, intelligence analysts, etc.—and in real time, Ames says.

The Lynx Advanced Multi-channel Radar (AMR), the latest Lynx SAR system from General Atomics, is providing new information on dismounted targets to GCS operators and the battlefield network.

During testing of the Lynx AMR on the Predator B aircraft, the radar was specifically evaluated for dismount (personnel walking or running) detection performance over its full field-of-regard, according to a General Atomics release. Lynx AMR achieves dismount detection performance using space time adaptive processing (STAP) and delivers compliant STANAG 4607 output to the GCS and its dissemination channels. The GCS software also supports real-time cross-cueing to the aircraft's electro-optical infrared (EO/IR) payload. STANAG 4607 is the NATO standard for ground moving target indicator formats.

"The ability to detect and track dismounts and slow-moving vehicles over large areas and to cross-cue the on-board video sensor to areas of interest is an emerging military and civilian surveillance requirement, says Linden Blue, president, Reconnaissance Systems Group, General Atomics. "The Lynx AMR provides this capability over its full field-of-regard in a low-cost, plug-and-play configuration for Predator B and Sky Warrior Alpha aircraft."

Walby, a former U2 pilot says UAV aircraft and payload operators are much more involved in the mission than he ever was—"I was just a bus driver keeping the jet and payload safe," along a pre-planned mission only capable of changing aircraft location but not interacting with the sensors.

The constant flow of intelligence from long-endurance UAVs such as the Global

SPECIAL REPORT

Hawk enables the operators to feed it to analysts and agencies around the world in near real-time, Walby continues. This information advantage is similar to "always being two to three moves ahead in a chess game," he adds.

The GCS onboard ship

The U.S. Navy MQ-8B Fire Scout unmanned helicopter from Northrop Grumman Aerospace Systems in San Diego, Calif., has control stations based on the ground and aboard ship, says Mike Roberts, control segment integrated product team manager at Northrop Grumman Aerospace Systems.

The main difference between the ground stations and those aboard ship is that the shipboard control is plugged into the ship's communication network, while the ground control station uses a Northrop Grumman communication system, Roberts says. Fire Scout's shipboard control station is housed in a room where the separate target illumination radar (STIR) was located and communicates directly with the ship's air traffic control via the internal communications system, while the ground segment uses a radio to communicate with air traffic control, Roberts says.

The Fire Scout uses its FLIR Systems BRITE Star II electro-optic/infrared laser designator payload to provide reconnaissance, surveillance, and target acquisition at sea, Roberts says.

The sensor played a prominent role in the first ever drug interdiction by the USS McInerney during a recent deployment in the eastern Pacific, according to a Northrop Grumman release. "During a routine Fire Scout training flight off the ship, the sensor detected and acquired a narcotics 'go-fast' boat. Fire Scout tracked the boat covertly for several hours, feeding real-time video back to the McInerney. Eventually, a U.S. Coast Guard law enforcement attachment aboard the ship was able to move in on the drug traffickers, seizing approximately 60 kilograms of cocaine."

"Fire Scout is currently in the flight test portion of the system development and demonstration (SDD) phase of the program, which is taking place at the Webster Field annex of Patuxent River Naval Air Station, Md.," says Brooks McKinney, spokesperson for Northrop Grumman. "SDD is scheduled to end at the end of this calendar year. A deployment is planned in early 2011. A decision on full

rate production is expected in March 2011.

The Fire Scout payload operator controls the different functions of the sensors such as a laser range finder and communicates the intelligence through the ship via radio communication and other communication systems with ground forces, Navy ships, and the Coast Guard, Roberts says.

The most difficult task in flying an autonomous, unmanned helicopter at sea is landing the aircraft on a windy day aboard a moving target, Roberts says. At the end of its mission it will hover behind the ship, wait for a signal from the ship to land, and use its instruments to determine the speed of the ship and its pitch/roll and position

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in the water to make a proper deck landing, he adds.

Fire Scout uses a system called the UAV common automatic recovery system (UCARS) from Sierra Nevada Corp. in Sparks, Nev., that shoots "harpoons" into holes on a 7-foot diameter location on the deck, he continues. Once the harpoons are engaged and the deck sensors pick up the weight of the aircraft, crew members come out and chain it down. The entire landing is monitored from the control station in case any of the steps for landing—harpoon or weight sensors—malfunction, the landing can be aborted, Roberts says.

COTS integration on the Fire Scout control station

The Fire Scout control station uses COTS electronics in the control stations, Roberts says. For the control computer they use a Themis Computer RES-32 system running Sun Microsystems' Solaris operating system, he adds.

The Themis RES-32 comes in a three rack unit chassis, uses the Sun Microsystems 1.28GHz UltraSPARC IIIi processor, and has a XVR-1200 high performance graphics card, enabling 3D graphics performance, Themis officials say. The RES-32s can be easily expanded through the addition of Sun or other commercially available, off-the-shelf networking cards, I/O, peripherals, and other value-adds, company officials say.

The racks are from 901D in Tallman, N.Y., and are qualified to MIL-STD 901D and MIL-STD 810, Roberts says. The company, 901D, named themselves after their product, he adds.

The software and protocols follow STAN-AG 4586, a NATO standard enabling NATO member nations to participate in military operations with their own unmanned systems sharing UAV-generated intelligence with each other, Roberts says.

Roberts also says that his team is looking at Ethernet now and in the long term because it is ubiquitous and makes integration a lot easier.

Like any integrator of COTS electronics, Fire Scout engineers must deal with obsolescence management, Roberts says. If a product or component goes obsolete,

vendors typically set up a notification and "we then go out and look for an equivalent part from the same vendor or from a different supplier," Roberts says.

The lesson some vendors continue to "learn the hard way" is that they need to make their parts backwards compatible, Roberts says. Many times a part is discontinued and a new one is offered without backwards compatibility, he adds.

When that happens, "we initiate a trade study and then put it up for competition," Roberts continues.

Currently, there are separate ground control stations for each UAV, Walby says. They are closed systems—for example, a Fire Scout GCS only works with a Fire Scout UAV and so on, he adds.

There are also differences within each platform depending on the end user, Wal-

"There is no new name given to the ground segment, the U.S. Air Force and Navy refer to them as a Common Ground Segment, but there is no specific name at this time," Walby says. "We also refer to it as an 'Open System Ground Segment,' meaning it is not specifically tied to a single platform."

It is a ground segment that is "designed around an open system architecture," Walby continues. "Much the same as today's computers use common processors and USB ports for peripherals, tomorrow's ground segments will have similar hardware—a main operation system but different applications running to control different platforms or sensors."

An example of a common GCS in operation would have a Global Hawk operator team finishing their mission, then a Fire Scout or Broad Area Maritime Surveillance (BAMS) team comes into the same GCS and uses it to fly the Fire Scout or BAMS just by switching to a different software module, Walby says.

The system will be based on an open architecture, keeping the software independent from the hardware, Walby says. Currently, Northrop Grumman is developing a GCS that works with all Northrop Grumman platforms, but down the road the Air Force, or other services may want a GCS that is independent of supplier and platform, he adds.

General Atomics officials are developing the next-generation "Advanced Cockpit" GCS, Ames says. "The Advanced Cockpit's design significantly improves the pilot's situational awareness while reducing the workload. "It greatly increases the operator's situational awareness through the use of multiple high-definition "wrap around" displays that use Digital Elevation and Terrain Data (DTED) to provide a 120-degree view across the cockpit's large high-definition screens.

"Computer symbology can be electronically presented on the screens so that the pilot has a comprehensive common operating picture of the airspace in which he is operating," Ames explains. "This 120-degree view augments the pilot's otherwise narrow field of view camera system. Ergonomically designed to optimize flight crew performance, the Advanced Cockpit uses



The Puma AE man-portable unmanned aircraft system from Aerovironment uses a ground control station that is stored in the warfighter's rucksack and can go from packaged to operational in five minutes.

by says. For example, NASA has a Global Hawk variant that has different requirements than the Air Force and these modifications are made in the software programs, he continues. The same is true for the European version of the Global Hawk—the EuroHawk, Walby notes.

A platform-agnostic GCS

The increased use of unmanned aircraft is calling out for commonality among the ground stations to save money in training and development costs, Ames says. The services are developing requirements to have UAV ground stations be independent, cutting down on the cost to the U.S. taxpayer, he adds.

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intuitive touch screen displays to reduce training time and cost.

"It employs sophisticated software that includes the use of 3-D moving maps, providing the pilot with the ability to track" the Predator-series UAV's movement in a multi-dimensional display, Ames continues. "It also employs a "modular open architecture that allows incorporation of best-of-breed components, reducing costs while improving interoperability and capability."

The Advanced Cockpit is currently in flight test and is expected to be available around 2013, he adds.

All of this commonality will be accomplished through the software, Walby says. "We will leverage as much COTS as possible, depending on how mission critical the system is," he says. Open architectures and common standards and equipment will be important for these systems.

As the services move to the next-generation common ground station they will probably be using the Linux operating system, Roberts says. The hardware has yet to be determined, as the Navy is still developing requirements, he adds.

In determining the type of operating system to use "it just depends on how you define real-time," Roberts says. The time between when Fire Scout operators initiate a command and see it carried out on screen by the aircraft needs to be short enough to seem instantaneous to them—it needs to be deterministic but not necessarily hard-real time like some avionics systems, he explains.

The technology to accomplish this is already here, what is taking time is nailing down the requirements between the Air Force, Navy, Army, and in some cases NATO requirements, Walby says. "Today the Air Force and Navy are working closely together to ensure the Global Hawk and BAMS systems are closely aligned with regard to this open architecture ground control system," Walby adds.

Human factors

The operators have a lot of input when it comes to designing the next-generation control stations, Roberts says. One of the recommendations is for a larger screen that replaces the two they use now on the Fire Scout—the aircraft operator and mission payload operator each have two screens, Roberts says. It will be a large 16 by 9 screen aspect ratio high-resolution display, he adds.

"One request that I've heard a lot" is to have the screens and windows configurations more flexible to accommodate the individual tastes of each operator, Roberts says. In the past the services would mandate one fixed display configuration for every operator and platform, but this cuts down on the efficiency of the operators,

who work better if they can customize their display configuration to their individual requirements, he explains.

Many of the kids coming out of school and boot camp are used to the flexibility of modern personal computers and video games and work better with machines that provide that, Roberts says. ●



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Achieving the information advantage

Warfighters on the digital battlefield require in their arsenal robust information technology tools that provide secure, reliable, and real-time access to mission-critical data.

By **COURTNEY E. HOWARD**

"The ability to collect, communicate, process, and protect information is the most important factor defining military power," writes Brian D. Berkowitz in *The New Face of War: How War Will Be Fought in the 21st Century*. "Information technology is so important in war today that it overwhelms everything else."

Bits and bytes of data and information are as important as bullets and bombs on today's battlefield—if not more so. Many defense organizations, in fact, understand well the competitive warfighting advantage gained through the efficient exchange of mission-critical data.

To that end, the U.S. Department of Defense (DOD) is pioneering network-centric operations (NCO) and network-centric warfare (NCW), intended to increase mission effectiveness through optimized information sharing and collaboration across a robust, distributed network. At the same time, the United Kingdom Ministry of Defence is striving toward network-enabled capability (NEC), and the Swedish Armed Forces government agency is adopting network-based defense (NBD).

Wars are increasingly digital; battlefields are transforming into robust networks of informed, geographically separated military personnel; and, the role of electronics and information technology is growing in military environments. Yet, the digital battlefield is not without its challenges, which the DOD and industry technology partners are working diligently to overcome.

Greater data

Growth in the number and the capabilities of "sensors and robotic platforms have accelerated the generation of data," says Joe Miller, director of Joint Tactical Radio System (JTRS) Ground Domain for General Dynamics C4 Systems in Scottsdale, Ariz. "This data must be collected, processed into information, and disseminated in a timely fashion to improve situational awareness, command, and control."

Increased data and connectivity, as well as the growing sophistication of attackers, implies a greater need for security, explains David Kleidermacher, chief technology officer at Green Hills Software in Santa Barbara, Calif.

Aaron Frank, product marketing manager of networking switches and routing products at Curtiss-Wright Controls Embedded Computing in Kanata, Ontario, also notes an "increased awareness of the value of sharing information from one system to another, and between systems. As we see and use more and more information on the battlefield, and as this information is increasingly

Crystal Group's RS378 SSD storage system, deployed on the U.S. Air Force's CV-22 Osprey tiltrotor aircraft, is designed to withstand extremely high vibration.

shared between groups, it will enable better decisions to be made to ensure successful tactical missions.

"A key element in the digital battlefield is the value of situational awareness information, and this information needs to be shared among the various teams, whether they are on the ground, in the air, or at base camps," Frank continues. "To achieve this information sharing, systems must communicate over a variety of mediums, and with absolute security to protect sensitive data. So we need to manage an ever-increasing volume of sensitive information, and to share it within and between systems."





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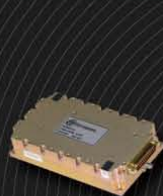
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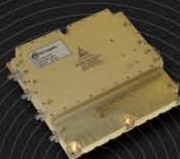
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Crystal Group has designed its systems, including the 4U Rugged Server (RS47F) above, with multiple, removable Rugged Drivepacks.

Mission-critical data also now takes many forms. “Voice no longer dominates the spectrum,” Miller adds. “It shares bandwidth with video and packet data.” Everyone wants video and needs to distribute that video over a heterogeneous network, explains Jon L. Korecki, executive director of strategic development at ViaSat Inc. in Carlsbad, Calif.

The use of unmanned aerial vehicles (UAVs) for information generation and dissemination has significantly increased the demand for digital video solutions, while the vulnerability of analog UAV feeds has expanded the need for data security in military environments, Korecki continues. “A key challenge is providing the video feeds from UAVs to all the stakeholders in a secure, managed way.”

More cores

Sensor-laden unmanned vehicles are being fielded in ever greater numbers, generating a wealth of data and driving the need for faster, more secure networks, greater bandwidth, increased processing power, and data storage. Legacy systems are largely unable to handle the increased workload of the digital battlefield.

“The trend is to use more off-the-shelf products to solve the problem today,” Korecki explains. “Customers don’t want to spend their money on a system that requires many years in development, but rather one that can be fielded in days.”

Meeting warfighters’ needs, including requirements for more processing power and more storage, “involves keeping up with the latest commercial off-the-shelf (COTS) systems,” admits Russ Clark, vice president of partnered solutions for DRS Technologies in Parsippany, N.J. “For example, Nehalem processors are already migrating into Westmere processors (6 cores vs. 4 cores).

“Our customers want the latest most powerful equipment that they can get their hands on,” Clark continues. “The biggest challenge

we see is synthesizing the data collected and quickly disseminating the result to those who need it.”

Technology firms and military organizations are also tapping more powerful, multicore devices to tackle multiple military applications on a single, compact computing platform. Multicore processors allow for more tightly integrated data and information processing, as well as provide a more efficient size, weight, and power (SWaP) platform, observes Frank.

“The move to multicore architectures allows for consolidation of traditionally discrete hardware devices into single multi-function devices,” reveals Robert Day, vice president of marketing at LynuxWorks in San Jose, Calif. “This is much needed in the battlefield, where avionics and vehicles need to reduce SWaP. Having a multicore solution combined with a MILS (Multiple Independent Levels of Security/Safety) separation kernel is a way to implement this with increased information and data security.”

Modern microprocessor trends, including multicore and virtualization, are making it more practical to give the warfighter the latest, most powerful multimedia environments (e.g., Android) without sacrificing security. “For example, with MILS virtualization,” Kleidermacher says, “we can partition security functions, such as encryption and key management from the multimedia OS, and use a trusted, certified OS like Integrity to manage the platform and host those secure applications.”

Frank sees software-based MILS as the way of the future in embedded computing applications. “Size, weight and power, performance, cost, and cooling (SWaP2-C2) constraints make it unfeasible to maintain separate security enclaves on independent and redundant computing platforms.”

Safe and secure

“As armies become more dependent on information technology, they will develop new kinds of vulnerabilities,” writes Berkowitz. The need to secure classified information has always been prevalent in military environments, and it is even more critical given the amount of data being gathered, exchanged, and stored across the battlefield among coalition forces.

Right now, a major shift is happening in the security realm. “It is mainly being driven by the need to communicate with a broader based coalition of allies,” Korecki notes. “As

our customers communicate more information, with more allies, and even across the services, the need for integrated security has grown. With the need to connect and share comes the need for cross-domain products that enable classified data to flow appropriately across boundaries between networks with different system security levels.”

The National Security Agency (NSA) has been driving a transition from traditional Type 1 high-assurance protection to a common standard of Suite B and non-CCI (cryptographic controlled item) products. In fact, the NSA has defined a new product category for broad-based use: Cryptographic High Value Product (CHVP). ViaSat worked with the NSA on the certification of what is being called the first CHVP device, the IPS-250 encryptor. The IPS-250, designed for all coalition use, is the first Suite B-based HAIPE (High Assurance Internet Protocol Encryptor) inline network encryptor.

“ViaSat is focused on providing secure communications to the warfighter, and we want push the envelope with new innovations that continue to improve information sharing on the battlefield,” Korecki says.

Software-centric communiqué

One such information-sharing innovation, software-defined radio (SDR) is fast becoming the dominant technology in military radio communications, as the DOD seeks to replace traditional radio network elements with SDR components and systems on the battlefield. The Joint Tactical Radio System (JTRS), a high-profile SDR garnering significant attention, is designed to deliver reliable, flexible, and interoperable voice and data communications to meet diverse warfighter needs via handheld, vehicular, airborne, and dismounted radios and base stations.

JTRS is based on an international, open Software Communications Architecture (SCA), a standard that uses CORBA on POSIX operating systems and enables increased functionality, flexibility, and expandability. Via the SCA, JTRS removes communications barriers that have previously limited information sharing between different types of incompatible radios used in battlefield operations.

Secure radios handle classified information, as well as sensitive but unclassified (SBU) data. SBU or Type 2 certified radios employ new information assurance technology that enables them to be operated by

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soldiers without security clearances, lowering the cost of the radio and simplifying the logistics around it, Miller describes. Radios that handle classified data are certified to Type 1. Security Verification Testing on all radios is scheduled for late 2010, which will lead to full NSA certification in mid-2011, he predicts.

"Joint Tactical Radio System Handheld, Manpack, Small Form Fit (JTRS HMS) is providing next-generation tactical networking radio products to the edge of the battlefield," Miller says. "These radios provide the additional bandwidth needed for data-hungry applications." Additional benefits include greater throughput, frequency agility, small size, and light weight. "Our smallest networking radio weighs approximately half a pound. The networking capability provides the reliable, secure exchange of data between any node within the network. They also provide the ad-hoc networking functions needed for mesh routing to maintain connectivity in challenging environments."

Connectivity challenges

Battlefield dynamics are accelerating, bringing in not only urban areas and villages, but also rugged mountainous terrain and caves, Miller explains. "This diverse environment presents challenges for communications networks. These networks cannot rely on fixed infrastructure like towers and repeaters; they must self form and self heal.

"Each radio in the network must be able

to act as a repeater to extend network coverage," Miller continues. "Networks are often forced to split and then merge, reestablishing themselves as forces move through these areas. When local line-of-sight connections are lost, signals must be routed via other means, including relays through UAVs or satellites."

Engineers at Raytheon Co. in McKinney, Texas, have introduced a system for tactical network communications that automatically and continually adapts to network changes and challenging urban environments. The Enhanced Mobile Ad-Hoc Network Radio System is designed to provide netted communications and tactical data for coalition interoperability and seamless coalition use in vehicle and dismounted applications.

"Our EMARS system supports a range of time-critical missions, such as air defense, command and control, and situational awareness, as well as user-defined host applications," remarks Brian McKeon, vice president, Raytheon Network Centric Systems Integrated Communications Systems. "It supplies twice the data rate of our earlier system to enable EMARS enhanced multifunction capability, and provides greater efficiency in secure wireless data exchange."

EMARS combines Raytheon's Enhanced Position Location Reporting System-XF-I, MicroLight DH500 handheld radio, and MANET (mobile ad-hoc networking) technology. "It provides a wireless, Internet Protocol (IP) capability network that implements



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Advanced Encryption Standard encryption over an extended frequency range,” says a spokesperson. “The system also uses the most advanced EPLRS waveform available for simultaneous voice, video, data, and critical position location information.”

SDR with COTS

“The rapid migration to software-defined radios using advanced multicore platforms, like the [Texas Instruments] OMAP3530 chip,” is a strong trend on the digital battlefield, says Chip Downing, director of Aerospace & Defense at Wind River, a subsidiary of Intel Corp. in Alameda, Calif.

Wind River has collaborated with PrismTech in Woburn, Mass., in the development of a high-performance SDR solution that combines Wind River’s VxWorks 6 real-time operating system (RTOS) with PrismTech’s Spectra SDR Operating Environment. It offers compliance with SCA 2.2.2 and POSIX PSE52 runtime libraries, and includes a small form factor core framework and embedded, object request broker (ORB) middleware. Harnessing the power of multiple Freescale and Intel processors, the SDR solution can achieve roundtrip times of less than 10 seconds to power up, initialize the platform, load waveform components, unload waveform components, and shut down the radio.

“This collaboration will help the shift from hardware-centric, proprietary radios to software-controlled, reprogrammable, standards-based radios that offer maximum flexibility and value,” says Rob Hoffman, general manager of Aerospace and Defense at Wind River. “By using COTS platforms and tools, project managers can help manage the risks of one-off custom software developments by exploiting the tooling support and robust testing, packaging, standards compliance, and professional support of commercial software products.”

The solution helps SDR developers use COTS components that adhere to SCA software radio standards, enabling radio manufacturers to meet the stringent requirements of the military and public sectors, including standards mandated by the DOD for JTRS and validated by the JTRS Test and Evaluation Laboratory (JTEL).

“Many U.S. military communications suppliers are now looking at developing their next-generation communications system based upon this combination of technologies,” says Downing. “The future is

both challenging and bright. The challenge comes with making Common Criteria security documentation and supporting evidence for a COTS product. The bright spot is that the entire industry has the capability to do this, and we will rapidly enable this in a wide variety of future platforms with the cost and quality advantages of all COTS solutions.”

A win for WIN-T

The Warfighter Information Network-Tactical (WIN-T) is another element, along with JTRS, in the U.S. Army’s LandWarNet NCO initiative to deliver high-speed communications and combat-related information to networked soldiers in the field.

Lockheed Martin, the lead for the WIN-T Increment 3 Transmission Subsystem, has completed an In Process Review (IPR) for the critical design of the next phase of the



LynxWorks’ LynxSecure separation kernel is incorporated in the U.S. Navy’s Common Display System.

Increment 3 Transmission Subsystem. The IPR assessed the design maturity of all hardware, software, and firmware elements of the Transmission Subsystem, which includes advanced components for both satellite and terrestrial communications at-the-halt and on-the-move, such as multichannel radios, antennas, and communications waveforms.

“The transmission subsystem provides the foundation for the network’s dynamic capability to transfer data over a highly dispersed, noncontiguous area,” says a spokesperson. “Increment 3 continues development of the components needed to meet the full range of network capacity, security, and full on-the-move capabilities for the Army’s modular force.”

The milestone, achieved last month, marked the culmination of more than five years of development for this subsystem, explains Jim Quinn, vice president of Lockheed Martin’s Information Systems & Global Solutions-Defense in Gaithersburg, Md. “This review allows us to move into the corresponding implementation and test phases

of the program, so warfighters can soon realize the substantial advantages WIN-T brings to the battlefield.”

General Dynamics C4 Systems is the prime systems integrator for WIN-T, the team members of which include: Lockheed Martin, BAE Systems, Harris Corp., and L-3 Communications. With the IPR complete, the team moves into the build-and-test phase for the Transmission Subsystem components that form the tactical communications network.

Airborne RTOS

Battlefield information technology tools, such computing and communications systems, are taking advantage of various commercial components, including both hardware and software. LynxWorks’ Day is seeing this dual COTS trend, as well as the convergence of safety and security, in such areas as avionics.

“The requirements for fault-tolerant avionics systems to be connected and consolidated, and add security functionality to protect from malicious attacks, is starting to become reality,” Day explains. “This functionality really requires the use of modern separation and partitioned software RTOSs to be combined with more traditional desktop OSs and, at the same time, drives the need for multicore and virtualization-ready hardware platforms.”

Main flight control applications are not ready for this move, especially in commercial avionics; but, for other avionics subsystems and in some military applications, the time is right, according to Day. “LynxSecure was designed to be safety and security certified, and can run OSs and applications at different levels of safety and security next to OSs and applications that are more general purpose, with the separation kernel managing the partitioning between them,” he says.

Barco in Kortrijk, Belgium, selected Wind River’s VxWorks 653 operating system as the foundation for its CDMS-3000 Control Display and Management System, employed in French armed forces aircraft. “The CDMS-3000 product family provides openness and flexibility to customers, while also offering COTS certification to systems integrators,” says Jean-Christophe Monfret, product management director at Barco. “As a foundation for the future, we required an industry-leading, COTS, DO-178B-certified RTOS. Barco chose VxWorks 653 to power the CDMS-3000, which has been selected

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for a variety of civil and military transport and surveillance aircraft.”

Green Hills’ Integrity RTOS technology, certified by the NSA-managed National Information Assurance Partnership (NIAP) lab to EAL6+ High Robustness, is employed in various military information systems, including JTRS and the F-35 Joint Strike Fighter. The desire to manage multiple levels of security information on the plane drove the requirement for EAL 6+ certification.

“These trends will continue, driving increased demand for higher-assurance technology—not just the OS, but other critical components, such as drivers, network protocols, and file systems—while keeping up with the latest bells and whistles coming from the consumer markets,” Kleidermacher says. “The challenge lies in marrying military requirements with the chip vendors and OEMs who are economically driven far more by the consumer than the warfighter. Luckily, the demand for security in the consumer world is increasing for many of the same reasons, and we are taking maximum advantage of the new security features coming from COTS (e.g., virtualization, trusted platform modules, crypto accelerators, etc.).”

Separation kernels at sea

The U.S. Navy, concerned with the security of shipboard systems, launched the Open Architecture Computing Environment (OACE) initiative. Navy officials are partnering with technology firms to develop OACE, a compatible set of COTS computing infrastructure components, including hardware and software, that serves as the computational framework upon which tactical and support applications are built.

LinuxWorks’ LynxSecure separation kernel is incorporated in the U.S. Navy’s Common Display System (CDS), an \$83 million OACE project that supports the modernization of DDG1000 Zumwalt destroyers and Aegis guided missile destroyers. CDS, a survivable and configurable high-assurance workstation, provides operators access to multiple shipboard applications simultaneously. The LynxSecure separation kernel and hypervisor enable multiple guest operating systems to run concurrently at different security levels, without compromising security, reliability, or data integrity, says a company spokesperson. “This is critical because military systems such the CDS display console system require adherence to rigid high-assurance security requirements.”

Open-source OS

Another operating system gaining military interest is Google’s Android, which uses a modified version of the Linux kernel, includes middleware and key applications, and is designed for mobile devices. Engineers at Raytheon Co. in Falls Church, Va., employed Android software tools to develop

a mobile device application to facilitate faster intelligence sharing.

The Raytheon Android Tactical System (RATS) delivers multimedia content on a common mobile device to warfighters on the battlefield, potentially accelerating the decision-making process from hours to minutes or seconds. The RATS device disseminates

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vital intelligence data, which is instantly viewable and searchable via the Distributed Common Ground System (DCGS) Intelligence Backbone (DIB) architecture. Raytheon engineers continue to develop Android applications for intelligence collection and analysis—such as license plate reading, streaming video camera feeds, and facial recognition—intended to enhance warfighter safety with tactical alerts based on the intelligence collected.

“RATS provides U.S. military forces with a last mile of connectivity for delivering images and full motion video to warfighters,” says Mark Bigham, vice president of Raytheon’s Defense and Civil Mission Solutions. “We are providing an innovative technology that is available in the commercial market and applying it to warfighter needs. Utilizing existing



The JTRS HMS Manpack radio is the first two-channel, software-defined radio capable of network-centric connectivity and legacy interoperability, supporting advanced (SRW, MUOS) and current-force (SINGARS, SATCOM, HF, EPLRS, etc.) waveforms. (Image courtesy General Dynamics C4 Systems.)

technologies provides developers the ability to focus on requirements that warfighters need now.”

Solutions exist to help engineers devise embedded applications for the Android OS on mobile devices. Google offers an Android Software Developers Kit, and Mentor Graphics in Wilsonville, Ore., provides a “Getting Started with Android” packaged service, commercial support for Android, and user

interface technology for device differentiation. Mentor offers video tutorials, webinars, and white papers on designing for the Android open-source platform.

Information at hand

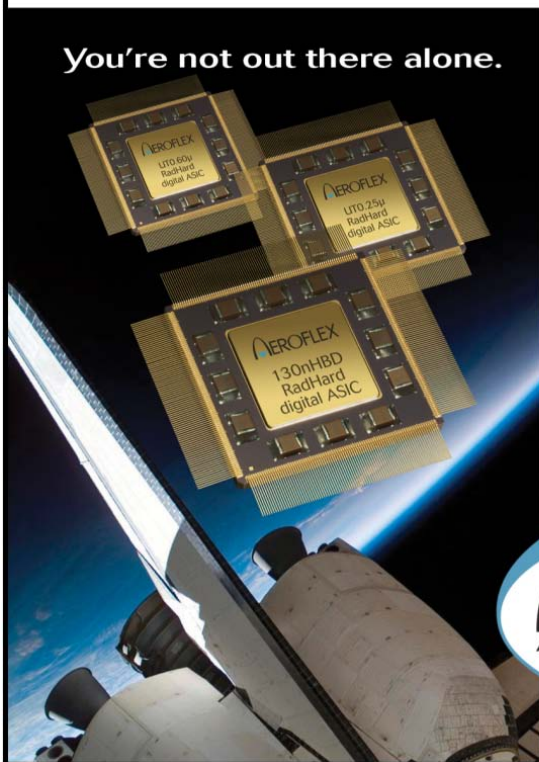
“Applications are being distributed down to the soldier as display and processing technologies have significantly dropped in size, weight, and power,” Miller recognizes. “The trend to move data applications down to the individual soldier will continue. Much like the iPhone and Droid applications in commercial cellular, soldiers will have access to applications to increase their effectiveness and improve their safety.” Examples include mapping, chat, and command-and-control applications, all of which require data and further drive the need for networking and greater bandwidth, he says.

Lockheed Martin engineers in Orlando, Fla., have developed the Tactical Digital Assistant (TDA), a ruggedized, tactical handheld device providing situational awareness, command-and-control, and blue force tracking capabilities to brigade and below forces. Dismounted soldiers with the TDA can maintain secure communications and exchange vital position and situational awareness data with mounted forces in an operational environment. The TDA supports shared full-motion video and sensor command and control, can host Android, and sports an open architecture and ruggedized design able to withstand harsh environments.

“The Lockheed Martin TDA leverages our systems integration experience to meet tactical-level warfighters’ critical needs in a joint operational environment,” describes Rich Russell, director of Sensors, Data Links, and Advanced Programs at Lockheed Martin Missiles and Fire Control. “Our solution supports on-the-move communication and information sharing with vehicles and other platforms for improved intelligence, surveillance and reconnaissance, and enhanced combat readiness.”

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Rugged data handling

Makers of portable computing platforms continue to enhance the capabilities of rugged laptops and handheld computers to meet military data demands. "The trend to continuously improve the performance in rugged computers does not show any sign of ending," Clark admits.

Personnel at Getac Technology Corp., maker of rugged, mobile computing solutions in Irvine, Calif., gain many customer requests for faster processors and better graphics, says John Lamb, Getac's director of marketing. In fact, Getac engineers have upgraded the company's E100 tablet PC with such commonly requested features as a more powerful, 1.6GHz processor, a hot-swappable battery, and an 80-gigabyte solid-state drive.

"A lot of people are focusing on data assurance and drive encryption," Lamb notes. "Customers want full drive encryption, or FDE. Everything from every application and the operating system itself becomes part of full-drive encryption."

"Long-range Wi-Fi—not consumer-grade, but 100-milliwatt Wi-Fi—is another common request," Lamb adds. Distance is a challenge with Wi-Fi, because it fails and devices often lose the connection. "Customers are looking for longer-range Wi-Fi. Getac has developed, tested, and deployed systems with long-range Wi-Fi. It is an ongoing trend."

Satellite communications

As the amount of information to be shared has grown, the demand for more bandwidth in battlefield communication systems continues to grow, Korecki says. "The continuing trend is to IP-based networking for most new communication systems being developed or deployed. The shift to IP has been in response to the need to share situational awareness

The Joint Tactical Radio System Handheld, Manpack, Small Form Fit Rifleman Radio (AN/PRC-154) is optimized for operation in Soldier Radio Waveform (SRW) networks. (Image courtesy General Dynamics C4 Systems.)



data, specifically video, across a unified digital battlefield."

Also driving the requirement for more bandwidth on the battlefield are: the increased demand for UAVs and video surveillance, and the need or mandate to secure video links and protect IP networks from cyber attack, Korecki explains. ViaSat is investing in the development of high-capacity satellites, such as the company's deployable satcom terminals, to meet growing bandwidth needs and low-cost requirements, he says.

The company is building UAV feeds, based on its Enerlinks digital video data link system for UAV video transmission, that can use private and commercially available satellite capacity and distribute it anywhere on the battlefield.

GigE on the GIG

Battlefields and network-centric operations might soon require Gigabit Ethernet (GbE) network bandwidth to connect with the DOD's Global Information Grid (GIG), given the rate at which data is being gathered and disseminated.

There is "growing interest in using Ethernet everywhere in an ISR [intelligence, surveillance, and reconnaissance] system, all the way up to the sensor," says Ian Dunn, Ph.D., chief technology officer at Mercury Computer Systems in Chelmsford, Mass. "A few of our radar customers are probably on the cutting edge of this trend: They have many sensor elements, all producing gigabits of data, driving a large Ethernet network."

"For now, customers are not talking about a single, converged network, but multiple independent networks used for distributing raw sensor data to a signal processing subsystem; for interconnecting signal processing, data exploitation, and information dissemination functions; and for command and control," Dunn continues. "While separate networks

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allow for the isolation of the various traffic flows, Ethernet brings with it an expectation of ubiquity for data as well as command and control." Nonetheless, he envisions a day when separate networks are virtualized and folded onto a single network or, at least, fewer networks.

Curtiss-Wright's Frank, too, is seeing "an increasing desire to converge live video, data, and voice on one managed network within a platform, which is driving us toward 10GbE faster than expected." As information is increasingly shared between groups, it will enable better decisions to be made to ensure successful tactical missions, he says. "We are seeing a move to GbE Networking versus MIL-STD-1553 for communications between platforms on the battlefield."

OpenVPX on the battlefield

In the open-standards arena, engineers and executives at Curtiss-Wright are witnessing a move to VPX/OpenVPX versus VME for information and data on the embedded battlefield. "This standards-based approach provides segmented backplane connectivity and facilitates separate data, control, management planes," Frank mentions. "VPX systems provide higher intra-system, cross-sectional bandwidth and can support higher-bandwidth sensor interfaces—both important in meeting the operational requirements of current programs and providing growth for the future."

Mercury Computer Systems is announcing a line of rugged, OpenVPX servers to address the growing need for more net-centric operation, and to support the convergence of signal processing, mission computing, data exploitation, and dissemination in a rugged compute cluster. "With the exception of signal processing, very little is done at the sensor today," Dunn says. "We believe these SWaP-efficient products could tip the balance in favor of doing as much processing as possible at the sensor, with the goal of improving the time-to-information metric."

Data on the move

From a hardware standpoint, solid-state storage (SSD) technology is dramatically affecting how system designers think about data acquisition and retention, explains Jaden Ghylin, technical director at Crystal Group in Hiawatha, Iowa. "SSDs are opening up a whole new realm of possibilities for capturing data that just wasn't possible with rotational hard drives," he says. "We are now

able to capture terabytes of data in a matter of hours on mobile surveillance platforms. This capability allows for the capture of extremely high-resolution images and video while on the move."

Advances in SSD technology also increase the amount of data that radar and video capture applications can collect in real time, enabling high-definition video capture and the addition of more cameras and sensors on surveillance platforms, Ghylin explains. Solid-state Rugged Drivepacks (RDp) from Crystal Group are designed to meet growing demands for high storage capacities and increased information security. Soldiers can transfer or secure data quickly by physically swapping out the drive packs. "The ability to physically remove storage media from the computer system is an almost universal requirement from our customers and, thus, Crystal has designed all its systems with multiple, removable drive bays," he says.

"Information technology is now the essential difference between winning and losing. Victory goes to the side that understands how to use information technology more effectively."—Brian D. Berkowitz in *The New Face of War*

Advances in SSD performance, along with the introduction of Intel's multicore Nehalem and Westmere CPU architectures, are providing massive bandwidth and processing capabilities, Ghylin describes. "System designers are now able to consolidate multiple systems into one or vastly expand the capabilities of the system." Designers are also taking advantage of performance increases through virtualization, replacing multiple computers in a rack with one high-performance server, he continues.

"With increases in storage capacity, there needs to be an increased awareness of the security of that information," Frank adds. "Information also needs to be protected in the event the storage device falls into the wrong hands." Curtiss-Wright's P/XMC-552 NAND Flash SSD provides encrypted storage and an Instant Purge facility to erase the entire storage array within seconds.

Crystal Group's RS378 SSD storage system is deployed on the CV-22 Osprey, described by Ghylin as one of the most challenging airborne platforms. "The tilt-rotor design of the Osprey results in extremely high vibration levels during the transition from helicopter to airplane." The RS378 is designed to handle

this type of environment and can be used to store maps or for real-time video and data capture, among other applications, he says.

DRS Technologies provides rugged servers designed for mobile military applications that run on military vehicle power and "operate under conditions that would destroy a commercial unit," says Clark. One customer selected the company's DC-powered servers to be installed into combat vehicles and used "on the move" to gather sensitive data and transmit it in real time to operations centers.

Exponential and continual growth

The strong trend of capturing more data to improve military intelligence capabilities will continue, Ghylin predicts. "The military is just beginning to experience the same explosion of data that has been seen in the enterprise world for the past 10 years. The challenge will be to provide systems with enough performance to process and store this data."

"Technology and applications need to address how to sort through all the sensor data being collected faster, easier, and using less manpower, as the DOD's appetite for more data will only increase," Clark forecasts. "Second, we need to solve the issues involved in sharing intel and data with those who need it on the battlefield—U.S. forces and its allies."

Dr. Stephen Jarrett, chief technologist at the U.S. Navy Space and Naval Warfare Systems Center in Charleston, S.C., might tend to agree. "We are inundating the soldier with data, not information," he said in his talk during the Military & Aerospace Electronics Forum in San Diego last month. "If you go into Walmart, they can tell you what you bought last time and anticipate what you are likely to buy this time. We need a similar solution to assist the soldier in the field who needs specific data; we need to anticipate his needs and deliver on them."

Technology firms serving the mil-aero community will doubtless continue to innovate and deliver ever more rugged, secure, and high-performance information technology tools with which to manage and exploit what many describe as a military intelligence explosion. ●

OPINION

Notice to prospective sellers of electronic components companies: know your true value

By **KENNETH STERN**

The aerospace and defense electronics components market is large and fast growing, driven foremost by the explosive growth in defense electronics spending for the upgrade of existing weapons platforms as well as the development of new platforms. While several large companies exist, the market generally is composed of smaller companies that specialize on various electro-mechanical or opto-mechanical products, focused on RF/microwave, sensors, thermal management, interconnect, and optics applications.

Over the years, larger companies have strategically broadened the product offering to their customer base by acquiring smaller components companies. These acquisitive companies are well-capitalized and staffed by an experience team of military and aerospace experts and outside advisors, whose goal is to identify likely acquisition candidates and acquire them at a discount to their true value.

It is important to understand the true value of a company to prospective acquirers. In classic terms, the value of a business is the net present value of its future cash flows. Many buyers use earnings before interest, taxes, depreciation, and amortization (EBITDA) as a proxy for cash flow. While not perfectly correlated, EBITDA has become synonymous with the earnings by which companies are often valued.

Many component original equipment manufacturers are privately held owner/operator businesses. The owners often pay themselves above market salaries, expense perks, and, to minimize income and income taxes, expense excess material purchases and capital goods that would otherwise be capitalized on the balance sheet. If the valuation of the company is based off of EBITDA, the reported EBITDA of the company is often significantly depressed from its true value, making it critical that the true historical EBITDA of the company be determined prior to entering into a sales process.

Once the true EBITDA of the company is known, it is important to develop a financial model for future EBITDA. The EBITDA

model is driven by a revenue forecast, and the development of the underlying costs associated with that revenue. The revenue forecast should be based on historical product, program and customer sales, and new product, program, and customer activity based on recent quote and design activity.

Once a defendable revenue forecast is prepared, the costs associated with the revenue can be derived. Financial models often are developed based on average cost of goods and selling, general, and administration (SG&A) percent of revenue. However, while some costs are variable, many are fixed.

The cost of goods should be segmented by variable material, variable/direct labor, and fixed and variable overhead. Overhead that is fixed should be expected to increase with inflation, not revenue. SG&A should also be divided by fixed and variable costs. By developing a detailed cost model, the forecasted EBITDA should grow at a much quicker rate than revenue, taking advantage of the operating leverage on the fixed costs.

The performance of an acquired company owned by a strategic buyer should be greater still. On the revenue side, a strategic buyer should be able to increase revenue by leveraging their customer base and sales channels. From a cost perspective, there should be significant cost savings, derived from:

- a) achieving economies of scale on material purchases and employee health benefits;
- b) eliminating duplicative expenses such as field sales, outside legal and accounting expenses; and
- c) the avoidance of costs to develop products or infrastructure that the acquired company already possesses.

Take an example that assumes the acquirer can increase revenue by cross selling and leveraging a larger sales/distribution organization, save 10 percent on material purchases, reduce 5 percent of variable overhead, eliminate the manufacturers' rep selling, and reduce \$50,000 in advertising expenses.

In this scenario, the 2013 EBITDA of the

business acquired is more than twice that if the business operated as a stand-alone entity. The present value of future cash flows is then discounted by a discount rate, which is the financial threshold that an acquiring company expects to earn on its investment. The greater the discount rate, the lower the value of future cash flows; e.g., \$100 five years from now at a discount rate of 10 percent is equal to \$62 ($100/(1.105)$); at a 20 percent discount rate, the value is \$40 ($100/(1.205)$).

The discount rate is driven by the financial thresholds of acquiring companies and the perceived risk of an acquirer to these future cash flows, including customer concentration, the proprietary nature of the company's products, and the stability of the business, among others. The net present value of the company declines the greater the cost of capital. The more strategic the business is to a buyer, the lower is the buyer's perceived risk of an acquisition and the lower their cost of capital.

Additionally, the greater the operating synergies created through an acquisition, the greater the future profitability (EBITDA), and valuation. While acquirers expect to retain the value of the synergies they create, having a competitive sales process necessitates the bidding companies to increase their offer, thus, in effect, transferring a portion of the value of the synergy created.

So given the anticipated number of acquisitions in the OEM components market, it is likely that a large acquisitive company may approach a business unsolicited. To make the most of the value of a potential transaction, it is critical to: understand true profitability; understand the potential profitability that a company can provide the strategic acquiring company; and engage in a competitive sales process to convert a portion of the acquirer's created value to the seller. ●

Kenneth Stern is president of Synxronos, a military/aerospace advisory firm focused on selling privately held technology-oriented businesses.





PRODUCT INTELLIGENCE

Military electronics cooling and thermal management issues press for new materials development, potential move away from COTS

By **JOHN KELLER**

Electronics experts developing technology for aerospace and defense applications confront few issues as daunting as the heat generated from their designs. Engineers are under constant pressure to develop ever-smaller and more powerful electronics, yet the cost of doing so is creating ever-larger amounts of heat.

Among their core challenges, then, is how to remove all this heat, while preserving system power and performance, as well as reducing size and weight for military and aerospace applications like

unmanned vehicles, night-vision equipment, and body-worn computers, sensors, and signal processing.

Electronics heat removal and thermal management is pressing for the development of new materials to wick heat away from components on boards and in chassis, and also is providing incentive for systems designers to rethink their commitment to commercial off-the-shelf (COTS) technology.

"In the military, we still believe these systems have to be out there for 50 years, but how can you design these systems

for upgrading over that time," says Gerald Janicki, senior director for programs and business development at Meggitt Defense systems Inc. in Irvine, Calif. "The easiest way is to pull away from COTS," Janicki says.

Instead, Janicki suggests one approach to removing heat efficiently from military and aerospace electronics systems is to design them from the beginning with heat removal in mind, rather than what has been the engineer's traditional approach over the past two decades of designing with COTS technology and cooling as best he can.

COMPANY INFORMATION

Advanced Cooling Technologies Inc.
Lancaster, Pa.
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www.1-act.com

AMETEK Specialty Metal Products
Wallingford, Conn.
203-265-6731
www.ametekmetals.com

Amulair Thermal Technology
San Diego, Calif.
858-309-4718
www.amulair.com

Applied Thermal Technologies LLC
Santa Clara, Calif.
408-522-8730, Ext. 207
www.thermalcooling.com

The Bergquist Company
Chanhassen, Minn.
800-347-4572
www.bergquistcompany.com

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520-746-0251
www.brushceramics.com

Celsia Technologies
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305-529-6290
www.celsiatechnologies.com

Cooliance
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www.cooliance.com

CoolIT Systems Inc.
Calgary, Alberta
866-621-2665
www.coolitsystems.com

Degree Controls Inc.
Milford, NH
603-672-8900
www.degreec.com

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www.furukawaamerica.com

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Sterling, Mass.
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Heat Transfer Research & Development Ltd.
Mt. Prospect, Ill.
847-577-5967
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<http://mdswebmaster.com/UK/MDS2008/cms/>

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www.stego.de/us

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Pressing needs for new ways to cool electronics also are encouraging systems designers to try different kinds of materials to conduct heat away from critical components. Materials approaches for conducting heat off of chips and boards often are closely held company secrets.

"The higher the thermal conductivity, the better. This is a competitive advantage," explains Ivan Straznicky, principal engineer and technical fellow at Curtiss-Wright Controls Embedded Computing in Leesburg, Va.

Straznicky says there is at least one unintended benefit of ever-growing needs for system performance and power to the thermal-management engineer. Demands for more power are leading computer experts to use new generations of multicore microprocessors, and these devices tend to be physically larger than their single-core predecessors.

Larger devices are easier to cool, he says. "The latest and greatest Intel processors, like the Core i7, are around 45 watts, which is a big jump from previous processors. The silver lining is: because they are adding more cores, the die size is getting bigger. It's not just the amount of power you have to cool, but the amount of power per square inch—or the power density," Straznicky explains.

For these devices and other heat-producing components, embedded computer designers using conduction cooling not only are looking into new heat-conduction materials that are able to withstand shock, vibration, and other extreme conditions of aerospace and defense applications, but they also are investigating more exotic approaches, such as heat pipes and vapor chambers, Straznicky says.

Designers using convection cooling are considering new developments in large heat sinks, stepped-up air flow with fans or blowers that act like turbines inside electronics enclosures that enable systems designers to increase air flow over hot components.

Where the latest conduction- or convection-cooling techniques fall short, however, designers are looking into the kinds of liquid-cooling approaches that call for the kinds of point designs that eliminate COTS parts. These approaches are expensive, and designers use them only where other techniques cannot do the job, Janicki says.

"The better the industry gets at

packaging, the better they are at thermal management," Janicki says. "We have a lot of challenges ahead of us."

One application that may drive the newest electronics cooling techniques is the U.S. Army's Ground Combat Vehicle (GCV), which essentially will be a much larger version of the Bradley Fighting

Vehicle, Janicki explains.

"GCV has a lot more electronics, more communications, and more defensive systems on it," Janicki explains. "These things will all require cooling; some things will be air cooled, but some things will need to be liquid cooled or cold-plate cooled." ●

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ELECTRO-OPTICS WATCH

Raytheon to design laser guidance and control section of laser-guided Maverick air-to-ground missile

By **JOHN KELLER**

TUCSON, Ariz.—Munitions guidance experts at the Raytheon Co. Missile Systems segment in Tucson, Ariz., are developing the laser guidance and control section of the newest variant of the Maverick air-to-ground tactical missile—the AGM-65E2/L—under terms of a \$34.4 million U.S. Air Force contract.

Raytheon engineers will give the laser-guided Maverick an enhanced laser seeker and software to reduce the risk of collateral damage and enabling aircraft pilots to use onboard aircraft lasers to designate targets for Maverick. The AGM-65E2 is the U.S. Navy and Marine Corps variant of the laser-guided Maverick, while the AGM-65L is the U.S. Air Force variant.

The Maverick missile is designed for close air support against tactical targets such as armored vehicles, air defenses, surface ships, ground transportation vehicles,

and fuel storage facilities. Maverick has two types of warheads—one has a contact fuze in the nose, the other has a heavy-weight warhead fitted with a delayed-action fuze, which penetrates the target with its kinetic energy before detonating.

The laser-guided Maverick will ride laser beams from either the host aircraft, other aircraft in the area, or from laser ground-based laser designators to their intended targets.

“The laser-guided Maverick is a weapon for urban combat and high-speed maneuvering targets,” says Harry Schulte, vice president of Raytheon Missile System’s Air Warfare Systems product line. “The combat-proven Maverick is integrated on more than 25 aircraft in 33 nations, and we hope to have the newest addition to the Maverick family available for export soon.”

For more information, contact Raytheon Missile Systems online at www.raytheon.com/businesses/rms. ●

DARPA seeks to improve performance of electro-optical system that helps snipers hit targets in crosswinds

By **JOHN KELLER**

ARLINGTON, Va.—The U.S. Defense Advanced Research Projects Agency (DARPA) in Arlington, Va., is asking industry to make improvements to electro-optical technology developed to enable snipers to hit targets with their rifles at long ranges with only one shot in crosswind conditions.

DARPA released a broad agency announcement (DARPA-BAA-10-67) for the One Shot Phase 2E program to develop a field-testable prototype observation, measurement, and ballistic calculation system that helps snipers hit targets with the first round, under crosswind conditions, up to the maximum effective range of the weapon.

This project is a follow-on to the original One-Shot program begun in 2007, and developed under terms of a \$2 million research contract by electro-optical systems experts at the Lockheed Martin Mission Systems & Sensors (MS2) segment in Akron, Ohio.

The system developed under the \$7 million One Shot Phase 2E program should provide day and night direct observation of the target, measure everything that influences a bullet in flight, and rapidly calculate and display the aim point offset and expected crosswind variability in the shooter’s rifle scope.

The system must use technologies to operate over a range of visibilities,

Continued on page 38

Vision processor introduced by Sarnoff for next-generation vision systems

Sarnoff Corp. in Princeton, N.J., is introducing the Acadia II system on a chip (SoC) for real-time, portable, and low-power vision sensor processing. Developed with the support of the Defense Advanced Research Projects Agency (DARPA) in Arlington, Va., Acadia II uses ARM Quad Core processors to enable one SoC to take over the processing functions that in the past required additional systems, company officials say. Acadia II is for portable and wearable vision systems; security and surveillance platforms; manned and unmanned aerial vehicles; unmanned ground vehicles; border and perimeter protection; and vision-aided, GPS-denied navigation and guidance. “We can take an entire system and put it within the Acadia II SoC,” says Mark Clifton, Sarnoff’s acting president and chief executive officer. For more information, contact Sarnoff online at www.sarnoff.com.

MEMS optical switch with multimode 50-micron core fiber introduced by DiCon Fiberoptics

DiCon Fiberoptics Inc. in Richmond, Calif., is introducing a MEMS optical switch made with multimode 50-micron core fiber with a port count of as many as 1x8 in



one device primarily for military and avionics applications. Based on a platform that has been qualified to Telcordia GR-1221 (equivalent to certain methods from MIL-STD-883), these fiber-optic switches have passed billions of toggling cycles and survive high levels of shock and vibration, temperature cycling, damp heat, dry heat, and other adverse conditions, making them suitable for military and avionics systems. Packaged in a compact housing, the 1x8 optical

Lockheed Martin to design new rifle sight to help every soldier be a marksman

By **JOHN KELLER**

SAN DIEGO—Military optical sensor experts at the Lockheed Martin Corp. Mission Systems & Sensors (MS2) segment in Akron, Ohio, are developing an experimental advanced rifle sight that helps every soldier be a marksman by enhancing the ability to hit targets at ranges from 10 to 2,000 feet.

Lockheed Martin won a \$3.9 million contract for the Dynamic Image Gun-sight Optic (DInGO) program to develop an optical scope attachment for standard combat rifles like the M16 and M4 with field-of-view and angular magnification that can be automatically reconfigured and optimized based on the range to target.

Lockheed Martin experts will capitalize on recent developments in reconfigurable lenses, low-power large pixel-count digital imagers, foveated focal plane arrays, and low-power displays to produce revolutionary rifle sight capabilities.

Awarding the DInGO contract is the




U.S. Space and Naval Warfare Systems Command (SPAWAR) in San Diego, on behalf of the U.S. Defense Advanced Research Projects Agency (DARPA) in Arlington, Va.

Lockheed Martin optical systems integrators are being asked to produce a prototype rifle sight with rapid, seamless, automated, or hands-free actuation to enable soldiers to keep both hands on their weapons as they use the rifle sight.

The scope must allow for a wide field of view for close quarters battle, as well as sufficient magnification and resolution to hit moving targets farther than a quarter mile away. Lockheed Martin designers will compensate for bullet drop and moderate winds to enhance marksman accuracy at long ranges.

The optical resolution of the DInGO prototype will be sufficient to enable the user to recognize targets at ranges as far away as 1,000 feet between dawn and dusk.

The DInGO rifle sights will operate for as long as eight hours continuous operation—or seven-day limited operation—with two AA batteries. Ultimately, SPAWAR is asking Lockheed Martin to develop a rifle sight that costs less than \$600 in quantities of 50,000.

For more information, visit Lockheed Martin MS2 online at www.lockheed-martin.com, SPAWAR at <http://enterprise.spawar.navy.mil>, or DARPA at www.darpa.mil. 

switch measures 25 by 16 by 8.5 millimeters, and consumes less than 170 milliwatts of electrical power. The port count can be specified from 1x2 up to 1x8, and can be controlled via either TTL or I2C. In addition to the standard switch configurations, other configurations and special fiber types are also available. For more information, contact DiCon Fiberoptics online at www.diconfiberoptics.com.

Clear Align's Irvin to serve as board member of organization that helps commercialize military electro-optical technology

Angelique X. Irvin, president and chief executive officer of Clear Align in Eagleville, Pa., has been elected to the board of directors for the Electro-Optics Alliance (EOA) in Freeport, Pa., which helps link research, development, and commercialization to transfer critical military electro-optics technology to commercial

industry. Clear Align specializes in custom imaging, as well as in fiber optic sensors and laser sensors for military and aerospace applications. Irvin joins five other new board members: Chad Spalt of Raytheon Missile Systems in Waltham, Mass.; David Bjornberg of Compass Systems Inc. in Lexington Park, Md.; Steve Bachorski of Acutronic USA in Pittsburgh; Jason Farmer of Northrop Grumman Shipbuilding in Newport News, Va.; and David Patch of RSL Fiber Systems LLC in East Hartford, Conn. Irvin will also work alongside the four members remaining from the 2009–2010 elections, including board members Karen Berecz of Rockwell Collins, Paul Egbert of BAE Systems, Jorge Pica of Lockheed Martin, and Richard Ridgway of Battelle. "The EOA has done an exceptional job growing Department of Defense electro-optics science and technology and supporting the advancement of electro-optics industries and manufacturing," Irvin says. For more information, visit Clear Align online at www.clearalign.com, or the Electro-Optics Alliance at www.electro-optics.org.

Bright LED headlights with integrated infrared lighting for military vehicles introduced by Grote Industries

Grote Industries Inc. in Madison, Ind., is introducing a high-performance, high-output light-emitting diode (LED) lamp with two, high-intensity, infrared light engines integrated into its bezel for exterior military vehicle lighting. The ruggedized Trilliant IR LED white light with infrared light engines has been field tested in off-road conditions and shares the basic characteristics as other Trilliant LED WhiteLight lamps deployed with mobile warfighters. Each of the Trilliant IR's two light engines houses high-intensity infra-



» ELECTRO-OPTICS WATCH

red light emitting diodes from Advanced Vehicle Systems Inc. (AVS) in Jacksonville, N.C. The ability to retrofit existing Trilliant lamps quickly was a key factor in the lamp's overall design approach, says Eric Thorstensen, director of OEM sales for Grote Industries. Upgrading from an existing Trilliant LED WhiteLight lamp to a Trilliant IR lamp is as easy as ordering a bezel, he says. The new lights "will make U.S. warfighters considerably more stealthy, will provide them with a significantly greater range of visual acuity, and will provide an increased margin of security around every vehicle they will serve," Thorstensen says. For more information, visit Grote Industries online at www.grote.com, or advanced Vehicle Systems at www.advancedvehiclesystems.com.

KVH wins order for TACNAV II military navigation systems

KVH Industries Inc. won a \$2 million order for its TACNAV II tactical navigation system for use by an international customer. Shipment of this order is expected to begin in the second quarter of 2011 and conclude in early 2014. The TACNAV II tactical navigation system is for battle management and weapon systems. The system offers a compact design, continuous heading, and pointing data output, and a flexible architecture that allows it to function as either a standalone navigation module or as the heart of an expanded, multifunctional TACNAV system. With its fiber-optic gyro (FOG) and an optional compass sensor providing a complete backup to GPS, the TACNAV II can integrate with a host of applications, including navigation and data consolidation for battle management systems (BMS). "KVH's TACNAV II tactical navigation system is an important tool for navigation and coordination of vehicles operating in critical military situations," says Dan Conway, KVH's vice president of business development. "The system is crucial to keeping soldiers safe and out of harm's way, serving as a resource for navigation, battle management, and even as a backup to GPS."

Navy researchers look to Daylight Solutions to develop semiconductor laser technology to jam infrared-guided munitions

By **JOHN KELLER**

ARLINGTON, Va.—Scientists at the U.S. Office of Naval Research (ONR) in Arlington, Va., are looking to laser experts at Daylight Solutions Inc. in Poway, Calif.,



to develop multi-wavelength direct semiconductor laser technology with sufficient power to jam infrared sensors in precision-guided munitions.

ONR awarded a \$1.4 million contract to Daylight Solutions as part of an electronic warfare (EW) research initiative to develop next-generation technologies to detect and defeat imaging

infrared and multimode tracking systems, missiles, and other precision-guided munitions.

Navy researchers are asking Daylight Solutions to develop a compact laser to defeat guided munitions that employ scanning and focal-plane-array imaging sensors that operate in the infrared spectral bands—especially the atmospheric transmission bands at roughly 1–2, 3–5, and 8–12 microns that are designed to passively track targets, guide weapons, and negate the effectiveness of infrared countermeasures.

Daylight Solutions specializes in quantum cascade laser (QCL)-based molecular detection and imaging systems that combine QC gain media with patented external cavity quantum cascade laser (EC-qcl) technology, resulting in a broadly tunable or fixed-wavelength mid-infrared laser source.

For additional information, visit the Office of Naval Research online at www.onr.navy.mil, or Daylight Solutions at www.daylightsolutions.com. ●

DARPA from page 36

atmospheric turbulence, scintillation, and environmental conditions. The new effort calls for delivery of 15 operational and field-hardened systems, with purchase of as many as 100 additional units.

Previous work developed a brassboard system of a down-range unit that measured average downrange crosswind, range to target, spotter scope position, target heading, air temperature, pressure, and humidity to calculate the ballistic solution for a 0.308 bullet at ranges as far as 1,100 meters.

Although the brassboard system improved the first-round hit probability, its size, weight, and power (SWaP) were inadequate, the engagement range too short for the newest sniper weapons, and could not be used with standard rifle scopes.

The goal of phase 2E is to deliver 15 field-testable and hardened prototype

systems within 12 months of contract award that provides the capability to profile downrange crosswind and range to target in near real time, at longer ranges, and improved probability of a first round hit.

The integrated spotter scope (ISS) should measure crosswinds, maximum effective range of the weapon, temperature, atmospheric pressure, humidity, cant and pointing angles, and GPS coordinates, as well as allow direct day and night observation of targets with continuous updates of the aim point offset corrections, with no alignment verification of the laser/crosswind optics to the spotting scope necessary.

The rifle scope also should communicate the aim point offset and expected crosswind variability to the rifle scope using a wired or wireless data link.

More information is online at <https://www.fbo.gov/spg/ODA/DARPA/CMO/DARPA-BAA-10-67/listing.html>. ●

PRODUCT APPLICATIONS

SATELLITE COMMUNICATIONS

Raytheon to provide receiver terminals for the military Global Broadcast Service under terms of \$11.4 million contract

Military communications experts at the Raytheon Co. Intelligence and Information Systems segment in Garland, Texas, are providing the U.S. Air Force with AN/TSR-8 and AN/TSR-9 Transportable Ground Receive Suite (TGRS) terminals under terms of an \$11.4 million contract.

The TGRS consists of a next-generation receive terminal (NGRT) antenna, receive broadcast manager, and cryptographic equipment, which packs into three or four mobile transit cases. This equipment delivers data to users from the military Global Broadcast Service (GBS).

The GBS brings worldwide Internet Protocol broadcast of video, imagery, and other data to the edge of the Global Information Grid in support of U.S. forces and government agencies. The TGRS is available in two configurations that support reception of classified and unclassified broadcasts.

The GBS augments government communications systems to deliver large volumes of information to disadvantaged users



with limited or no data access. This service gives users access to broadcast mission-essential data over military and commercial satellites.

Awarding the contract are officials of the Air Force 653rd Electronic Systems Wing at Hanscom Air Force Base, Mass. For more information, visit Raytheon Intelligence and Information Systems online at www.raytheon.com.

ELECTRONIC WARFARE

Cobham to provide AN/ALQ-99 electronic warfare systems for Navy and Marine Corps EA-6B and E/A-18G electronic jammer aircraft

The Sensor and Antenna Systems segment of Cobham Defense Electronic Systems in Lansdale, Pa., will build the AN/ALQ-99 low-band, transmitter-antenna group electronic warfare system for U.S. Navy and Marine Corps EA-6B and E/A-18G electronic jamming aircraft under terms of a \$46 million contract from Naval Air Systems Command at Patuxent River Naval Air Station, Md., Cobham officials announced.



The AN/ALQ-99 receivers and antennas are mounted in fin-tip pods of the Navy and Marine Corps EA-6B and E/A-18G electronic jamming aircraft, while transmitters and exciters are in under-wing pods. The system intercepts radio signals, performs automatic signal processing, and jams the signals.

The system also can detect, identify, and radio communications and radar signals in signals intelligence (SIGINT) missions. The AN/ALQ-99 low-band, transmitter-antenna group (LBT-AG) is designed to protect strike aircraft, ships, and ground troops by disrupting enemy radar and communications, and is heavily used in military operations in Iraq and Afghanistan.

The contract to Cobham Sensor and Antenna pays for a third full-rate production lot of the AN/ALQ-99 airborne integrated electronic jamming system; an initial award procures 60 low-band transmitters and antennas, bringing the total number of production transmitters ordered to 217. To date, 80 of 217 transmitters have been delivered. Deliveries will continue through 2012.

For more information, visit Cobham Sensor and Antenna Systems online at www.cobham.com.

COMMUNICATIONS EQUIPMENT

Harris chosen to provide HF radio communications for DOD MRAP armored combat vehicles

Harris RF Communications in Rochester, N.Y., will provide Falcon II AN/VRC-104 HF military radio communications for the U.S. Department of Defense (DOD) Joint Mine Resistant Ambush Protected (MRAP) vehicle under terms of a \$139 million contract.

The Harris HF radio systems will be installed in standard-size MRAP vehicles and MRAP all-terrain vehicles (M-ATVs). The AN/VRC-104 system is a vehicular transceiver/amplifier that includes the AN/PRC-150 Type-1 certified HF radio.

"This software-defined radio system will provide beyond-line-of-sight communications in the rugged and mountainous terrain of Afghanistan," says Steve Marschilok, president of U.S. Department of Defense business at Harris RF.

For more information, visit Harris RF Communications online at www.rfcomm.harris.com.

ANTENNAS

Boeing provides new antenna, batteries for mission to International Space Station

Boeing provided six replacement batteries

» PRODUCT APPLICATIONS

and a space-to-ground antenna (SGANT) with accompanying boom assembly critical parts to NASA for the Space Shuttle Atlantis crew to carry to the International Space Station (ISS).

The six batteries will be installed on the ISS' port truss to replace old batteries that Atlantis will bring back to Earth. The batteries provide power while the ISS is in the Earth's shadow for approximately 30 minutes of each 90-minute orbit. The SGANT will increase the ISS's ability to conduct two-way data, voice, and video communications.

"The added SGANT will eventually more than double the station's existing ability to support and monitor activities such as experiments, robotic operations, and spacewalks," says Stephen Long, Boeing ISS Communication and Tracking engineer. "This new antenna will allow for the creation of two audio-only channels and an increase in video channels from four to six, and also include a new interface to the station's Large Area Network."

These additional capabilities are important to the station's future operations as crews move from assembling the ISS to fully making use of it for earth sciences and space-based science experiments.

Boeing's Checkout, Assembly, and Payload Processing Services (CAPPS) team also prepared Atlantis' entire mission payload for launch, including the Russian Mini-Research Module 1 and spare parts for the ISS' Canadian Dextre robotic arm.

The services and support Boeing provides under its CAPPS contract include planning for and receiving payloads, maintaining associated ground support systems, integrating payloads with the space shuttle, launch support, and space shuttle post-landing payload activities.

Boeing is the prime contractor to NASA for the ISS. In addition to designing and building all the major U.S. elements, Boeing also is responsible for ensuring the successful integration of new hardware and software—including components from international partners—as well as for providing sustaining engineering work.

NAVIGATION AND GUIDANCE **Honeywell to provide GPS/INS navigation avionics for Army and Navy helicopters, aircraft carrier landing systems**

Navigation and guidance systems experts

at the Honeywell Inc. Defense & Space Electronic Systems segment in Clearwater, Fla., are providing aircraft navigation systems that combine GPS satellite navigation with inertial navigation technology for U.S. Army and Navy helicopters.

Honeywell won a \$6.6 million contract to supply 81 embedded GPS/inertial navigation systems for the Army OH-58D Kiowa Warrior attack helicopter control display system 5 (CDS5) upgrade variants, the Navy/Marine Corps CH-53 Sea Stallion heavy-lift helicopter, and the Navy's AN/SPN-46 precision approach and landing systems aboard aircraft carriers.

Awarding the contract were officials of the 642nd Aeronautical Systems Squadron at Wright-Patterson Air Force Base, Ohio. For more information, visit Honeywell online at www.sac.honeywell.com.

SATELLITE COMMUNICATIONS

Raytheon to provide Army with SMART-T tactical MILSTAR satellite communications terminals in \$92.5 million contract

U.S. Army officials are asking the Raytheon Co. Network Centric Systems segment in Marlborough, Mass., to provide AN/TSC-154A advanced extremely high frequency (EHF) Secure Mobile Anti-jam Reliable Tactical Terminals (SMART-T) under terms of a \$92.5 million contract.

SMART-T, which mounts to the military Humvee, is a ground-based interface



to the Military Strategic and Tactical Relay (MILSTAR) communications satellite to extend communications to fighting forces widely dispersed beyond land-based, line-of-sight military radio communications.

The SMART-T has an internal GPS receiver for positioning and timing necessary for satellite acquisition. The satellite terminal provides secure, jam-resistant, extended-range, two-way, point-to-point and network voice, data, and video communications operating at the MILSTAR low data rate 75

to 2,400 bits per second, and medium data rate as fast as 1.544 megabits per second.

SMART-T can operate in intense electronic warfare and nuclear, biological, and chemical conditions, and can be removed from the humvee for fixed-site operations. A self-contained diesel generator powers the communications system.

Raytheon will perform the work in Marlborough, Mass., and should be finished by 2018. Awarding the contract was the Army Communications-Electronics Command (CECOM) Acquisition Center at Fort Monmouth, N.J.

For more information, visit Raytheon Network Centric Systems online at www.raytheon.com/businesses/ncs, or Army CECOM at www.army.mil/cecom.

NAVIGATION AND GUIDANCE

Northrop Grumman's inertial measurement unit selected for Joint Precision Approach and Landing Systems program

Raytheon selected Northrop Grumman Corp. to supply the inertial measurement solution for the Joint Precision Approach and Landing Systems (JPALS) Shipboard Reference program.

Under this contract, Northrop Grumman's Navigation Systems Division will deliver 18 LN-270 inertial navigation systems (INS) for the engineering and manufacturing development phase of the JPALS Increment 1A Shipboard Reference System (SRS). Future production orders are anticipated to be considerable, Northrop Grumman officials say.

The first LN-270 unit will be delivered in early 2011.

JPALS, designed and developed by Raytheon under a U.S. Navy contract, is an all-weather, all-mission, all-user landing system based on a local-area differential Global Positioning System (GPS). JPALS works with GPS to provide accurate, reliable, landing guidance for fixed and rotary wing aircraft and supports fixed-base, tactical, and shipboard applications.

For the SRS, each JPALS-equipped ship will employ three Northrop Grumman fiber optic gyro-based LN-270 INS units to measure the ship's motion.

"Northrop Grumman's LN-270 is a versatile solution for any application that requires highly accurate navigation, pointing or dependable stabilization—whether it be on land or sea," says

PRODUCT APPLICATIONS

Gorik Hossepian, vice president of navigation and positioning systems for Northrop Grumman's Navigation Systems Division.

The in-production LN-270 INS is a navigation system with low lifecycle costs because it requires no scheduled maintenance during its rated lifetime, officials say.

CONTRACT MANUFACTURING

LaBarge to provide printed circuit boards for F-35 jet fighter, A350 commercial jetliner, and C-17 military transport aircraft

Contract manufacturing specialist LaBarge Inc. in St. Louis is providing printed circuit card assemblies for commercial and military aircraft such as the Boeing C-17 military transport, the Airbus A350 passenger airliner, and the Lockheed Martin F-35 Joint Strike Fighter under terms of a contract worth about \$5 million a year from the Parker Aerospace Electronic Systems Division in Hauppauge N.Y.

Production on the LaBarge-built printed circuit boards will be at LaBarge's Tulsa, Okla., facility.

"Recent capital investments at our Tulsa operation give us the state-of-the-art technology and manufacturing flexibility to meet our customer's requirements for high-performance printed circuit card assemblies," says Craig LaBarge, La Barge's chief executive officer and president.

Parker Aerospace is an operating segment of Parker Hannifin Corp. in Irvine, Calif., which builds flight control, hydraulic, fuel, fluid conveyance, and engine components and systems for aerospace and other high-technology applications. LaBarge, meanwhile, is an electronics contract manufacturer.

For more information, visit LaBarge online at www.labarge.com, or Parker Aerospace Electronics Systems at www.parker.com.

SOFTWARE

Real-time software from Green Hills chosen for Norwegian Joint Strike Missile

Missile systems designers at Kongsberg Defence Systems in Norway needed real-time software for the air-launched Joint Strike Missile for the Norwegian air force. They chose the Integrity real-time operating system (RTOS) and MULTI integrated development environment from Green Hills Software Inc. in Santa Barbara, Calif.



Kongsberg engineers will use the Integrity RTOS in several multicore computers on the Joint Strike Missile (JSM), which will be mounted externally or internally in the bomb bay of the Norwegian versions of the Lockheed Martin F-35 Joint Strike Fighter.

The Norwegian Joint Strike Missile is for anti-surface warfare and naval fire support over sea and land. Green Hills Software also will be part of the missile's telemetric, safety launch, and planning software.

"We wanted a proven, reliable RTOS with a rich ecosystem of development tools and support for our chosen Freescale Power Architecture processor," says Harald Ånnestad, president of Kongsberg Defence and Aerospace.

For more information, visit Green Hills Software online at www.ghs.com, or Kongsberg Defence Systems at www.kongsberg.com.

TEST AND MEASUREMENT

U.S. Navy selects LeCroy Corp.'s digital oscilloscopes

LeCroy Corp. in Chestnut Ridge, N.Y., won a contract to supply digital oscilloscopes to the U.S. Navy's Supply Systems Command. The contract has an estimated quantity of as many as 200 WaveRunner oscilloscopes per year for five years. LeCroy's WaveRunner 64Xi-A-N oscilloscopes passed technical requirements as part of a competitive bid to qualify for U.S. Navy acceptance.

"The versatility of the WaveRunner 64Xi-A-N and its advanced waveshape analysis capabilities enabled us to win this important contract," says LeCroy president and CEO Tom Reslewic. "The WaveRunner covers a broad range of applications, making it ideal for use for the U.S. Navy. The Navy plans to use the WaveRunner to support in-field naval applications, such as radar, communications, and navigation,

as well as for the calibration and repair of electronic equipment."

The LeCroy WaveRunner 64Xi-A-N is well suited for everyday characterization, validation, and debugging advanced problems. The software architecture improvements also incorporate key elements of the X-Stream II architecture, which permit preview and abort capability, allowing the customer to have control of the oscilloscope without any delay.

COMMUNICATIONS EQUIPMENT

Amphibious Assault Vehicles upgraded with Parvus rugged IP routers, Ethernet switches

Parvus DuraMAR 1000 routers and DuraNET 2955 Ethernet switches are installed in Amphibious Assault Vehicles (AAVs) in support of a SPAWARSYSCEN Atlantic/U.S. Navy technology refresh program to enhance onboard vehicle network-centric capabilities.

Parvus supplies the Tactical Switch Router (TSR) along with several other Line Replaceable Units (LRUs) for the EFV program through a contract with General Dynamics. Both the legacy Advanced Amphibious Assault Vehicle and its successor specify a version of the Parvus DuraMAR IP router subsystem, says a company representative.

Both the DuraMAR and the DuraNET 2955 Ethernet switch subsystems are ruggedized versions of commercial off-the-shelf



Cisco Systems 3230 and 2955 Series products. These units leverage mobile network routing and Ethernet switch technology from Cisco to deliver secure data, voice, and video communications to stationary and mobile network nodes across wired and wireless networks and/or in-vehicle network communications. Both units sport a hardened aluminum chassis with MIL-C-38999 connectors and MIL-STD-810F compliance. ●

NEW PRODUCTS

To submit new products for consideration, contact John Keller by e-mail at jkeller@pennwell.com

» TEST AND MEASUREMENT

Handheld oscilloscope with USB connect for storing displayed waveforms introduced by Saelig

Saelig Co. Inc. in Pittsford, N.Y., is introducing the HDS3102MN rugged 100 MHz, two-channel,



handheld oscilloscope and 3 3/4 digit multimeter with FFT spectrum display capability. A USB connection for storing or printing the displayed waveforms is included. HDS3102MN has a rugged influence resistant casing, easy-to-use controls, and a bright 640-by-480-pixel liquid crystal display. Battery life is six hours. Silica gel keys offer shortcuts for simplified operation of this portable scope, which has stable scope triggering in Free Run, Single shot, Edge, and Video modes, Digital Persistence to observe slow-moving signals (1 sec, 2 sec, 5 sec, and infinite), and averaging to reduce noise. The Auto-Set lets the Oscilloscope display and measure signals automatically, optimizing the position, range, time base, and triggering to assure a stable display of virtually any waveform. RMS multimeter measurements include: Volts, Amps, Ohms, Continuity, Resistance, Capacitance, Diode, with separate inputs for multimeter and oscilloscope signals. Sampling is 500 Megasamples per second. For more information, visit Saelig online at www.saelig.com.

» RUGGED COMPUTERS

Rugged dual computer server for shipboard, airborne, and land-based applications introduced by Crystal Group

Crystal Group Inc. in Hiawatha, Iowa, is introducing the RS101x2 dual rugged server for applications in environments where performance, ruggedness, and reliability are imperative, such as military shipboard electronics, airborne, and land-based applications where virtualization is not possible or practical. The RS101x2 unit contains two Penryn computers in one chassis. The rugged 1U dual server offers extended capability with a shock and vibration rating of 4.43 GRMS in combined wheeled vehicle and aircraft profiles, and a temperature range of -40 to 55 degrees Celsius. The RS101x2 is available with Intel CPU architecture: 2.53 GHz Intel Core 2 Duo Mobile, Penryn T9400, Socket P, micro-FCPGA478. Expansion choices in this 18-inch rugged dual server include one slot per side: Mini-PCIe, 1XS, and Mini PCI, meaning greater adaptability.

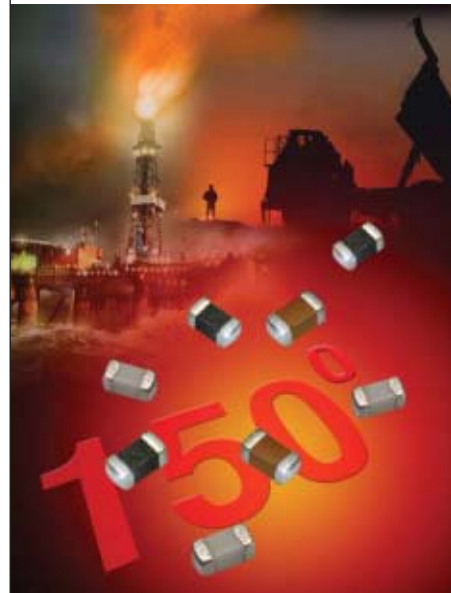


Each side offers one external 3.5-inch bay, capable of one or two removable 2.5-inch SATA HDDs for as many as four drives in each server. For more information, visit Crystal Group online at www.crystalrugged.com.

» COMPONENTS

High-temperature multilayer ceramic capacitors for harsh environments introduced by AVX

AVX Corp. in Myrtle Beach, S.C., is introducing the X8L Series multilayer ceramic capacitors that operate in temperatures as high as 150 degrees Celsius for applications in harsh environments. AVX's X8R Series and X8L Series MLCCs are RoHS-compliant, and have low-loss performance and temperature



stability. X8R capacitors demonstrate a capacitance variation over temperature of plus-or-minus 15 percent between -55 and 150 C, while X8L products have a variation of plus-or-minus 15 percent between -55 and 125 C and +15/-40 percent from 125 to 150 C. The X8L MLCCs are AEC-Q200-qualified making them appropriate for under-the-hood automotive applications. In industrial applications, they also can be used as bulk capacitors for temperature sensing modules, as well as control units, says Tim Piver, product marketing manager at AVX. For more information, visit AVX online at www.avx.com.

» POWER ELECTRONICS

DC-DC power converters for military and avionics applications introduced by VPT

VPT Inc., a HEICO company in



NEW PRODUCTS

Blacksburg, Va., is introducing five rugged DC-DC power converters with output voltages that satisfy the reliability requirements and varying output voltage needs of avionics and military electronics. The power electronics modules now available are the DVFL single-output, 120-watt, 6.3-, 7-, 8-, 9.5-, 18-, and 28-volt models; DVFL, dual-output, 120-watt, 6.3- and 9.5-volt models; DVTR, single-output, 40-watt, 7-, 8-, 18-, and 28-volt models; DVTR, dual-output, 40-watt, 8- and 18-volt models; and DVHF, single-output, 20-watt, 5.7- and 18-volt models. "We've optimized these modules to fit the needs of today's commercial and military avionics instrumentation such as navigation and guidance systems, flight data recorders, radar, and other demanding applications," says Michael Bosmann, senior vice president of marketing and sales at VPT. All three DC-DC power converter families are designed and manufactured in facilities qualified to ISO9001 and certified to MIL-PRF-38534 Class H and Class K and MIL-STD-883. Optimized for absolute reliability for the demanding environments of avionics and military applications, all of these new DC-DC converters feature high power densities, extremely small sizes, and light weights for aircraft use; thick-film hybrid construction in hermetic packaging; full military-required temperature ranges of -55 to 125 degrees Celsius; critical reliability performance; wide input voltage ranges; high efficiencies; low output noise; and fault-tolerant design with patented technology. Environmental screening ensures rugged performance through extreme temperature cycling, shock, vibration, salt atmosphere, barometric conditions, and moisture and solvent resistance. For more information, visit VPT online at www.vpt-inc.com.

» DATABASES AND NETWORKING

MIL-STD-1553 compatible single-stub box coupler introduced by Beta Transformer Technology

Beta Transformer Technology Corp. in Bohemia, N.Y., is introducing the BXC-A-1 single-stub box coupler with MIL-STD-1553

databus compatibility. The product is for system development, laboratory, test, and flight line applications. The product

delivers reliability and optimum performance in a miniature footprint by using Beta's standard MIL-PRF-21038 transformers. The BXC-A-1 operates over the military temperature range of -55 to 130 degrees Celsius. Beta Transformer Technology is a subsidiary of Data Device Corp. (DDC). For additional information, visit Beta Transformer Technology online at www.bttc-beta.com.



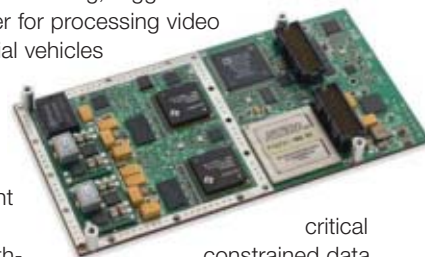
» EMBEDDED COMPUTING

Rugged XMC embedded computing module for UAV video processing introduced by GE

GE Intelligent Platforms in Charlottesville, Va., is introducing the ICS-8580 video streaming, rugged XMC embedded computer for processing video from unmanned aerial vehicles

(UAVs). The ICS-8580 responds to the rapid growth in unmanned vehicles and their requirement to deliver mission-critical video over bandwidth-constrained data links. It is designed to be a plug-and-play solution that requires minimal integration or software development.

The ICS-8580 XMC card is small, weighs 3.5 ounces, and consumes 10 to 15 watts of power, and can be deployed in demanding environments in aerospace and defense applications. The XMC board supports several video formats with either two channels of high-definition video or four channels of standard-definition video. The ICS-8580 has the industry-standard H.264 video compression codec, and is software-reconfigurable to support alternatives



General Dynamics Itronix products are preloaded with Microsoft Windows® Vista® Business

Rugged computers go where you go.

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» NEW PRODUCTS

such as JPEG2000. For more information, visit GE Intelligent Platforms online at www.ge-ip.com.

» EMBEDDED COMPUTING

Rugged PCI-104 single-board computer for harsh-environment applications introduced by ADLINK

ADLINK Technology Inc. in San Jose, Calif., is introducing the ReadyBoard 740 PCI-104 rugged single-board computer for applications in harsh environments that require high-end video performance, such as vehicle computing platforms, self-service kiosks, digital signage, and video surveillance. The ReadyBoard 740 computer board integrates an Intel Atom processor D510 (dual-core) or Intel Atom processor D410 (single-core) with ICH8M chipset, on board SSD, H.264 hardware video decoder, networking, and I/O. ADLINK's ReadyBoard 740 provides multicore computing power with integrated graphics and hardware HD video decoder. Featured are a 1.66 GHz dual-core Intel Atom processor D510 or single-core Atom processor D410, one SO-DIMM for as much as two gigabytes of 667 MHz DDR2 RAM, and a Broadcom Crystal HD H.264 video decoder. Graphics capabilities of the ReadyBoard 740 include VGA, LVDS, DVI output and efficient high-



definition playback (1920 x 1080). Conducted transient emissions and immunity are well known critical phenomena for power supply in vehicular applications and other severe environments. ADLINK has designed the MiniModule PWR, an

optional power protection module to allow the ReadyBoard 740 to meet the specific demands of in-vehicle power environments. With the MiniModule PWR, the ReadyBoard 740 supports a wide input voltage range, reverse battery protection, overvoltage protection (OVP), and DC/DC converter, making the ReadyBoard 740 suitable for in-vehicle devices. For more information, contact ADLINK online at www.adlinktech.com.

» DATA STORAGE

Rugged data storage system for mission-critical applications introduced by Themis

Themis Computer in Fremont, Calif., is introducing a rugged data storage system for mission-critical applications in harsh environments called RES-XStore, which supports as many as twelve 2.5-inch SAS or SATA HDD or SSD drives, with a maximum total capacity of 12 terabytes and is packaged in a 1U, 17-inch-deep, rack-mountable chassis. The system incorporates four hot-pluggable canisters, each containing three hard drives. The RES-XStore communicates with the host server, via an add-in host adapter and a PCI-Express x8. The RES-XStore includes a redundant array of independent disks (RAID) controller that supports RAID levels from 0 to 60. Each canister is hot-pluggable. The RES-XStore, as all products in the RES server family, is designed to operate in the most challenging environments. For more information, visit Themis online at www.themis.com.

» CONNECTORS

Photovoltaics connector with high-current rating and low power loss introduced by Amphenol Industrial

Amphenol Industrial Operations in Sidney, N.Y., is introducing a dual-rated (UL/TUV) photovoltaics connector to meet NEC 2008 without the need of extra locking collars and locking sleeves. Amphenol's Helios H4 PV connector uses Amphenol's



RADSOK technology to achieve high current ratings and low contact resistance to keep power losses to a minimum. The dual-rated Helios H4 photovoltaic connector is available through Amphenol's distribution network, which includes Avnet, PEI, Arrow, TTI, and Powell in the United States; RS and Farnell in Asia; and Lapp, HIK, and SOLAR- KABEL in Europe. For more information, visit Amphenol Industrial online at www.amphenol-industrial.com.

» RF AND MICROWAVE

GaAs MMIC upconverter for radar, electronic warfare, and electronic intelligence applications introduced by Hittite Microwave

Hittite Microwave Corp. in Chelmsford, Mass., is introducing the HMC711LC5 surface-mount gallium arsenide monolithic microwave integrated circuit (GaAs MMIC) sub-harmonic upconverter for military radar, electronic warfare, and electronic intelligence applications from 17.7 to 23.6 GHz. The HMC711LC5 delivers a signal conversion gain of 15 dB and IF bandwidth of DC to 3.5 GHz, and uses a double-balanced mixer driven by an active x2 multiplier and followed by a high linearity amplifier. The RF and microwave device also is for point-to-point radio, satellite communications, test and measurement, and sensors

NEW PRODUCTS

applications. This upconverter accepts LO input frequencies from 9.5 to 13.6 GHz, and LO power levels as low as 0 dBm, allowing it to be driven directly from a synthesizer output. The HMC711LC5 also exhibits +28 dBm output IP3 and +17 dBm output P1dB, and operates from one 5-volt power supply. This high-linearity converter is a much smaller alternative to hybrid style subharmonic upconverter assemblies and it eliminates the need for wire bonding by allowing the use of surface-mount manufacturing techniques. The HMC711LC5 is housed in a leadless RoHS-compliant QFN 5-by-5-millimeter SMT ceramic package, and is specified for operation from -40 to 85 degrees Celsius. For more information, visit Hittite Microwave online at www.hittite.com.

» COMPONENTS

Thin-film chip resistors from IRC receive preliminary qualification for space and military applications

Military-qualified thin film chip resistors from IRC Inc. in Corpus Christi, Texas, have received preliminary T-Level qualification from the Defense Supply Center Columbus (DSCC) in Columbus, Ohio, and the devices



are listed on the DSCC Qualified Products List (QPL), company officials announced. IRC is part of TT electronics plc. IRC is receiving DSCC Class-T qualification and DSCC QPL listing for its PFC Series thin-film chip resistors, which are available in 1505, 1206, 0805, and 0603 package sizes. DSCC T-qualified components are for space applications, and meet special standards for outgassing, 100 thermal shock cycles, 100-percent screening

for power conditioning and burn-in, destructive physical analysis, detailed pre-cap inspection, and capability to meet critical performance parameters like resistance noise. DSCC class-T resistors have a maximum failure rate of one-tenth of one percent every

1,000 hours of operation. Power rating for the resistors is dependent on chip sizes and MIL-PRF-55342 characteristics. The PFC Series thin-film chip resistors are qualified to E, H, K and M characteristics and are available with resistance

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» EMBEDDED COMPUTING

Atom-based, 3.5-inch single-board computer introduced by WIN Enterprises


WIN Enterprises Inc. in North Andover, Mass., is introducing the MB-80190 3.5-inch, single-board computer for industrial automation, networking, medical appliances, vending machines, in-vehicle infotainment, and other embedded computing applications. The CPU board supports Intel second-generation Atom processors in single and dual core versions, as well as dual Gigabit Ethernet LAN



ports, CompactFlash, VGA, LVDS, as much as 2 gigabytes of DDR2 SODIMM memory, 6x USB 2.0, high-definition audio interface, 2x SATA, 2x RS232, mini-PCI connector, VGA, and LVDS. Software support includes Windows XP and Linux versions where kernel support is available. For more information, visit WIN Enterprises online at www.win-ent.com.

» DATA CONVERSION

Ultra-wideband A/D converter signal-acquisition board introduced by Tekmicro

TEK Microsystems Inc. in Chelmsford, Mass., is introducing the Proteus-V5 ultra-wideband A/D converter signal acquisition VITA 41 VXS board. The new release is compatible with legacy VME embedded computing systems. The Proteus-V5 has two 10-bit analog-to-digital converter channels, each operating as fast as 5 gigasamples per second. Proteus-V5 is based on the e2v EV10AQ190 A/D converter device, which contains four separate 10-bit, 1.25-gigasample-per-second A/D converters. For additional information, visit Tekmicro online at www.tekmicro.com. 

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TEWS TECHNOLOGIES GmbH: Am Bahnhof 7 • 25469 Halstenbek/Germany
Phone: +49 (0)4101-4058-0 • Fax: +49 (0)4101-4058-19 • E-mail: info@tews.com

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GO MILAERO BLOG

Lakehurst, N.J., is still blimp central for the U.S. Navy

The Navy's mad scientists at blimp central—Lakehurst Naval Air Station, N.J.—are at it again in their continuing efforts to give satellite designers a run for their money. Seems the Naval Air Warfare Center Lakehurst folks are starting design of a lighter-than-air stratospheric airship with surveillance and communications payloads for emergency military operations across the globe.

The blimp guys at Lakehurst are onto something. They know that with all the nation's financial woes, something's gotta give in the defense budget over the next several years, and they're looking to airships as a way that's cheaper and quicker to develop than those expensive orbiting satellites.

You could launch an aerostat as a persistent surveillance platform and communications relay from almost anywhere, even at sea, and move it within hours or days to hot spots around the world. This is obviously an attractive alternative to waiting for the weather to clear at Cape Canaveral.

more  www.militaryaerospace.com/index/blogs.html

DEFENSE EXECUTIVE

DARPA pushes new frontier of military computing

Computer scientists at the U.S. Defense Advanced Research Projects Agency (DARPA) in Arlington, Va., are asking industry for novel technologies and approaches that offer dramatic advances in high-performance military computer performance, and enable so-called extreme scale computing—the notion of exceeding today's peta-scale computing to achieve one quintillion (1,000,000,000,000,000,000) calculations per second. DARPA released a broad agency announcement Monday (DARPA-BAA-10-78) for the Omnipresent High Performance Computing (OHPC) program to help develop high-performance computers to meet increasing demands for greater performance, higher energy efficiency, ease of programmability, dependability, and security in mil-aero computing.

more  <http://bit.ly/ajUqKa>

AVIONICS INTELLIGENCE

Commercial avionics designers take interest in MIL-STD 1553 databus

Historically, commercial avionics designers have preferred Arinc 429 and other databus protocols for systems, but databus manufacturers are seeing growing interest in MIL-STD 1553 for use in commercial aircraft cockpits. "We're seeing 1553 getting a lot of interest from the commercial aircraft industry," says Mike Hegarty, principal marketing engineer at Data Device Corp. in Bohemia, N.Y. Traditionally, 1553 was not used in flight critical systems on commercial aircraft but now system integrators are finding it meets their needs in newer systems, such as the Airbus A350 XWB. The architecture of safety-critical systems in new aircraft is moving from centralized processing toward distributed processing in which a redundant array of processors are used to control intelligent actuators over a digital communication bus, he says. "1553 is an ideal choice for the databus between the processors and actuators because of its robust performance and deterministic protocol."

more  www.avionics-intelligence.com

GO COMMAND POST COMMUNITY

Mil-aero industry invests in next-generation engineers

Companies such as Lockheed Martin in Bethesda, Md.; Tektronix in Beaverton, Ore.; and Fluke Corp. in Everett, Wash., are investing in the future of the industry, electronics, and the U.S. by pledging support for educational scholarships for future engineers. Lockheed Martin has pledged to donate \$1 million to the Denver School of Science and Technology, an open-enrollment public school in Denver, Colo. The

funding will support the development and expansion of the school's science, technology, engineering, and mathematics (STEM) curriculum. Tektronix and Fluke have donated \$100,000 to DeVry University for a five-year scholarship program. In the program, \$20,000 will be awarded each year in \$1,000 scholarships to 20 students.

more  <http://community.milearo.com>

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